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THE RELATIVE IMPORTANCE OF ASTIGMATISM IN THE PRODUCTION OF ASTHENOPIA.

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It is justly the pride of ophthalmology, that at least in the realm of physiological optics, it more nearly approaches to the status of an exact science than is possible in any other branch of medical or surgical practice. This fortunate position was attained when the Emmetropic Eye, as represented in the reduced Eye of Listing came to be accepted as the standard or model to which all other states of refraction of the human eye could be referred for comparison.

Great simplicity was at once introduced when any departure from this standard could be regarded as anomalous, and therefore the possible or even probable cause of disturbance of function. This ideal standard has, however, failed to commend itself to a number of ophthalmic writers, who have been unable to conceive of emmetropia as other than a transitional stage of development, standing between the hypermetropic eye with its short antero-posterior axis on the one hand and the long myopic eye on the other. It has been claimed (Mac Namara) that the small hypermetropic *ball* grows with the growth of the child, into the larger emmetropic ball—while Landolt has eloquently claimed that the tendency to myopia, *i. e.* increase of refraction of the eye, was but "a phenomenon of adaptation to the exigencies of the development of the species." In a recent article (*N. Y. Med. Record*, March 26, 1892.), an esteemed colleague of great experience, Dr. D. B. St.

John Roosa, has asserted that "hypermetropia may be said to be the refraction of the normal eye."

It is not my purpose to discuss these views in all their practical bearings, but simply to show that they must necessarily introduce great confusion, not to say error, into the practice of ophthalmic surgeons in the treatment of asthenopia.

The claim for hypermetropia as the normal eye is sustained, however, with some show of reason when we consider, that careful examination of large numbers of eyes, in the schools and elsewhere, has shown that the emmetropic eye, occurs in a very small percentage of the whole number examined, particularly in young children, while hypermetropic eyes are by far the most numerous. In addition to this fact, it has been cited that hypermetropia is the state of refraction found in the eyes, not only of young children, but also of animals, imbeciles and the uncivilized races, and is, therefore, the refraction of the natural or normal eye.

However captivating this view may seem, there are many facts which point strongly to its fallacy. In the first place, the small percentage of the emmetropic eye does not necessarily exclude it as a model. It is probable that an absolutely perfect hand, or foot, or nose would be found, on comparison with accepted standards, to occur in an equally low percentage; but the artist would not for that reason adopt a misshapen member as his ideal of beauty, however true it might be to nature, or however frequent its occurrence. Then too, I have myself shown that the emmetropic eye, enjoyed not only the highest acuity of vision, but was also less subject to asthenopia and disease than the hypermetropic eye. My own statistics agree, moreover, with those of other observers in showing that in the schools, emmetropia remained nearly constant in percentage throughout the school life, while myopia increased in percentage and hypermetropia diminished in a nearly corresponding degree, as the age of the pupils advanced.

At first sight it might appear that as age advanced the small hypermetropic ball had grown into the emmetropic or adult eye, and the latter into the myopic eye; but a more careful study revealed the fact, that the same pathological, intraocular changes were present, both in hypermetropia and myopia, the latter presenting them simply at a more advanced stage, the emmetropic eye in the meantime escaping injury.[1] This fact has been forcibly set forth also by Randall, in answer to the question, can hypermetropia be healthfully outgrown? (Trans. Amr. Oph. Soc. 1890.)

It is obvious from the foregoing that the views entertained as to the

[1]Weak eyes in the Public Schools of Philadelphia Trans. of the Pennsylvania State Med. Soc.

value and nature of emmetropia must materially modify the practice of the Ophthalmic Surgeon. If the eye with hypermetropic refraction is to be accepted as the model or normal eye, we are at once met with the clinical difficulty that, this "normal" state of refraction occurs in widely varying degrees, ranging from .25 D. or less, to 10. D. or more. Very few experienced persons would for example, class an eye with 10. D. of hypermetropia among normal eyes: since after early childhood H. would be absolute, and accurate vision even for remote objects, impossible. Moreover, as age advances the physiological diminuation in the range of accommodation must render successively lower grades of H., absolute. Dr. Roosa places the degree of hypermetropia, which may be disregarded in young subjects, at 2.50 D. "and possibly sometimes more," so long as any associated astigmatism is corrected. It is well known that occasionally high grades of hypermetropia are borne by certain individuals, without serious trouble, especially if the vocation does not require continuous near work, but that this is usually the case is not borne out by my experience. On the contrary, trouble is almost sure to appear if the occupation requires many hours of work in reading or writing. The well known disturbance of the relation between accommodation and convergence introduced by the hypermetropia becomes a disturbing factor, notwithstanding the great conservatism often shown in establishing a considerable relative range and region of accommodation and convergence. The astigmatism so frequently associated with hypermetropia adds greatly to the probability of asthenopia without a doubt, as is so forcibly shown by Dr. Roosa. In order, however, to study the relative importance of simple hypermetropia, I turned to the nosological index of *one* of my private case books. There were three hundred and twenty carefully recorded cases of asthenopic eyes with hyperemetropic refraction which had been carefully corrected, with rare exceptions under a mydriatic. Of these three hundred and twenty cases, 30 per cent. were simple hypermetropes, 70 per cent. of them having H=less than 2. D. It is not probable that a larger number would have materially changed these figures since they agree with Dr. Jackson's findings based upon 1610 eyes, 30.6 per cent. (Vid. Trans. Am. Oph. Soc., vol. v., p. 435.)

These records incidentally serve to show that we cannot disregard hypermetropia as a factor in producing asthenopia, even when the defect is much lower than 2.50 D. The relatively greater importance of astigmatism, however, is also demonstrated, since it was present in so large a percentage of these cases of hypermetropic refraction, 70 per cent. I am fully in accord with Dr. Roosa as to its very great importance. In the table setting forth the results of the examination of school children's eyes in Philadelphia, (1880), I have there shown that while in simple H. there was 35 per cent. of asthenopia, when astigma-

tism was also present, asthenopia rose to 50 per cent., and the intraocular pathological changes to 75 per cent., thus demonstrating abundantly the relative importance of astigmatism as a factor in asthenopia. Since, however, simple H. is also so potent we cannot lightly ignore its presence in the astigmatic eyes. A further analysis of the cases above cited revealed another interesting clinical fact, viz: that excluding the astigmatism there was great variation in the degree of axial refraction error between the two eyes of the individual. In 70 per cent. of the cases the error was higher in one eye than in the other. Now it is well known that this is a potent cause of functional disturbance, *e. g.*, asthenopia is much more liable to occur with H.=.75-D., on one side and 1.50 D. on the other, then if H=1.50 D. in each eye. In an unpublished study of a large group of patients with strabismus and heterophoria it was shown that the deviating eye was subject, with rare exceptions, to the higher degree of refraction error. Thus indicating the disturbing influence of a different near point for each eye. We cannot, therefore, wisely ignore these differences, when called upon to treat the functional disturbances of vision and the long catalogue of reflex symptoms so frequently associated with the defects of refraction, and muscular anomalies.

In the light of the lessons gleaned from these clinical studies it is obviously the duty of the surgeon to place the standard of normal vision at the best attainable point, and to the mind of the writer, this in the present state of our knowledge is to be found in the emmetropic eye. In observing distant objects, it is at rest. In accommodating for near objects, each eye enjoys a common near point, and the tension upon the convergence and accommodation is equal, a condition not possible in any other state of refraction. Since these theoretical considerations are found to be in accord with clinical experience I can see no reason for abandoning so simple a proposition. It may be true that certain enthusiastic practitioners, having accepted emmetropia as necessary to the best conditions of vision, have been too prone to ascribe a host of symptoms to eye strain, and have unnecessarily burdened their patients with glasses; but on the other hand, many patients have been allowed to suffer from these symptoms, or to find relief only at the cost of giving up the free use of their eyes. I have found persons wearing +.25 D., spherical glasses, over each eye for asthenopia. This will serve to illustrate one extreme of practice. At the other extreme, in the opinion of the writer stands Dr. Roosa's "*case iii*," (*loc. cit.*) In such a case, I am sure many surgeons would not feel that all had been done for the young man's relief until his "considerable hypermetropia, say two dioptres," together with his astigmatism, had been carefully corrected by glasses. Personally I would have but little "hope" of his ever returning camfortably to his books notwithstanding his year of out-of-

door life, without correcting glasses, no matter how perfect his general health might be. It is doubtless true that patients suffering from ill health feel their errors of refraction more sensibly than do the strong and vigorous, but this I regard as rather an additional reason for allowing them the comfort to be derived from glasses.

I have given the preceding details partly for the reason that they furnish a basis for estimating the value of the opthalmometer in correcting these defects of refraction. All that is claimed for it is, that in experienced hands, a close approximation to any existing corneal astigmatism may be determined. It throws no light upon the axial refraction of the eye. Without entering upon the vexing question, as to whether the asymmetry of the corneal curvatures really represents the existing astigmatism of the dioptric apparatus, it is sufficient to call attention to the facts already briefly given, to show that the usefulness of this ingenious instrument is confined to a small percentage of cases applying for relief from asthenopia. It has been shown that 30 per cent. of the hypermetropic eyes, had no demonstrable astigmatism. In many of these patients there was simple hypermetropia in one eye, and simple or compound hypermetropic astigmatism in the other, while in 70 per cent. of all the hypermetropic patients the axial refraction differed in the two eyes. In the presence of these clinical memoranda it is obvious that the ophthalmometer would have proved of service only in exceptional cases.[1] Only in so far as it served to verify the findings of other methods, that is to say as an additional check upon error in correcting the astigmatism, would it have been of value in the great majority of these cases applying for relief from their asthenopia.

It is, therefore, not "amazing" that the change from the older tried methods, to the use of the Ophthalmometer has not been "more widespread." The ophthalmologist who denies himself the advantages of this scientific instrument is no doubt losing the valuable aid which it affords, but that it will ever effect "a revolution in the science and art of the correction of errors of refraction" is open to serious doubt.

The correction of astigmatism alone for relief of asthenopia is by no means a new expedient. I have done this in a very large group of patients, and many times with marked relief, in cases where no difference existed in the grade of hypermetropia in the two eyes, but notwithstanding this experience, my judgment is unhesitatingly in favor of full correcting glasses, so that the refraction of the dioptric system, which is then made to include the correcting glasses shall approximate emmetropia.

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[1]Viz: where there was simple astigmatism only, in each eye, or where in compound errors, the same axial refraction was present in low degree in each eye.

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EQUILIBRIUM OF THE OCULAR MUSCLES.

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The muscular balance or equilibrium of the two eyes by which binocular vision is attained, originates in the unconscious desire for fusion, a psychical, inestimable and variable force, and is maintained by the balanced action of opposing muscles, and by an equal effort of accommodation. Of these three factors, the first, fusion, is the unconscious mental demand that the fovea centralis of each eye shall be held in such position that the retinal image of the external object in view shall be received by them. The second, uniform action of opposing muscles (co-ordination), is an accession to this demand, perfect in its way, when the nervous impulse to the muscles called into play by any and every visual act is distributed in equal degree, and the muscles themselves are capable of responding to the impulse; and the third, the equality of accommodative effort, gives to the two fovea images of equal size and clearness. These propositions hold true in the absence of high degrees of ametropia, of lesion of transparency, and of functional inactivity of retina and nerve.

A distinction must be drawn between the condition of *rest*, or repose, of the extraocular muscles, as manifested during sleep and ether narcosis, and the position of *equilibrium* in which muscular balance is not disturbed. In the former case, the eyes are turned upward and outward, and if there is a functional abnormal convergence present during consciousness it is materially lessened or altogether lost. The difficulties presented in rightly estimating the extent to which a tenotomy performed under general anesthesia should be carried, are familiar to every operator. It must be assumed therefore, in view of these considerations, that the upward and outward deviation of the visual axes is the position of absolute physiological rest. Muscular equilibrium, on the other hand, is the condition in which binocular vision is obtained in every position of functional activity through a relative equality of nerve stimulation and muscular response. In parallelism of the visual axes, for example, there is no tendency to deviation in any direction. The contraction of the external recti is just sufficient to overcome that of the internal recti muscles, the contraction of the superior and inferior recti are likewise exactly counterbalanced, and rotation is prevented by a similar and uniform contraction of the oblique. In a word, there is a harmonious and perfect balance of all the ocular muscles.

The maximum of physiological divergence is reached when the vis-

ual axes diverge beyond parallelism equal to a prism of 3°-4° base in, held close before each eye.[1] The maximum of physiological convergence is effected when the visual axes make the smallest possible angle with the basal line. The range of convergence extends from extreme physiological divergence to a point on the median line 3-4 *cm.* from the basal line, and the range of divergence is from the point thus described to the limit of physiological divergence beyond parallelism. Hence the range of convergence is equal to the range of divergence. They are indentical, the external and internal recti, overcoming prisms of equal degree. In expressing the strength of these two opposing sets of muscles in degrees of prisms, subtraction from and addition to, the degree must be made according to the angles of the visual axes at the time of the experiment. There is a point in the median line where abduction and adduction are exercised in equal degree, each equaling a prism of 19° 15′. The distance from the basal line to this point is 82 *mm.*[2] There is equilibrium of the external and internal recti muscles when in the whole range of convergence (divergence) the visual axis of each eye makes the same angle with the basal line.

In heterophoria, or heterotropia, one set of muscles predominates because a greater nerve impulse is given to it than to the opposing set, and not because the muscular power is increased by an hypertrophy of muscular tissue, except in old cases of squint where secondary changes have taken place in the muscles as a result of prolonged functional inactivity.

The power of the elevators and depressors must also be exerted in equilibrium at all distances, otherwise there is a vertical deviation or a tendency to deviation in this meridian. When the eyes are moved directly upward, and there is no obliquity of the vertical meridians, the superior recti and inferior obliqui are called into action, and when directed vertically downward, the inferior recti and superior obliqui are the muscles exercised. It is not possible then to measure the strength of the elevators or depressors by prisms, for if a prism base down is placed before an eye fixing a light at 6 *m.* the eye will move upward to overcome the prism, but a stimulation of the elevators of one eye will excite to similar action the corresponding muscles of its fellow. The second eye fixes the light and does not move because the opposing set of muscles contracts and maintains it in an unchanged position, thus in measuring the elevators of one eye we are, at the same time, measuring the depressors of its fellow, and *vice versa*.

[1]Different observers report different strength of muscles or their power to overcome prisms, according to the distance of the prism from the eye. The nearer the prism the weaker its effect. When we say hyperphoria=2°, for example, we should indicate whether the measuring prism is held in spectacle frames on patients face, or several inches away as in phorometer.

[2]A. Graefe *Arch. für Oph.*, Bd. 37, 1 s. 255.

It is, however, sufficiently accurate for clinical purposes to determine the equilibrium of the vertical muscles by tests at the distance of six metres. If there is an absence of vertical balance at this distance, it is proper to assume that it exists for objects at nearer distances. We have never been able to determine a hyperphoria for far or near only. The average strength of the muscles (vertical) involved by this affection is said to be equal to a prism of 3°, but a positive and accurate statement of their separate power is not warranted by existing knowledge of the subject. Their strength is variable, ranging from 2° to 6° or more, and may be still further developed by exercise.

Let us next consider muscular action in overcoming prisms under the condition of parallelism of axes. 1. Place a prism base out before R. eye and internal rectus contracts. The same stimulus is felt by internal r. of L., provided the centre for convergence in the brain is acting, but L. maintains its fixed position by an equal contraction of the external r. If the centre for lateral movements is acting the external r of L. feels equal stimulus as internal r. of R., but L. is held straight by the simultaneous and equal contraction of internal r. The tendency of R. to return to its original position by a contraction of external r. induced by the stimulation of the internal r. of L., is overcome by the desire for fusion, hence the strength of the prism is divided between the two eyes, and we are measuring in part divergence while testing convergence. Thus if we use a prism of 10°, convergence is assumed to equal a prism of 5° in each eye. The L. is inclined inward to an extent equaled by a prism of 5°, and outward, by contraction of external r., 5°. The eye, then, is maintained in straight position through a stimulation of internal and external recti of 2½° each.

2. If, on the other hand, a prism, base in, is placed before the R., the external r. contracts and the internal r. of L. is prevented from turning the cornea inward by the simultaneous contraction of external r. of L., equal in power to one quarter of primary contraction of external r. of R.

3. A prism base down before R. causes contraction of the inferior oblique and superior r. of both eyes, each eye receiving the same stimulus to turn upward. The L. is, however, maintained in its former straight position by the action of the inferior r. and superior oblique. But these muscles can not act independently of the same muscles of the R. The strength of the prism is divided between the two eyes.

4. A prism base up before R. induces inversely simultaneous contraction of the same muscles.

It will thus be seen that in divergence and convergence four, and in elevation and depresson eight, muscles obey the impulse originated by a prism not strong enough to prevent fusion with its base respectively in, out, up or down.

In equilibrium there is a balance between the muscular apparatus of each eye, and fusion exists as a result of equality of muscular tendencies in all directions. In the absence of equilibrium, there is a lateral or vertical tendency to deviation, and a non-adjustment of dynamic power. When the external recti are overcome by a prism, horizontal diplopia is manifested, and it is assumed in testing for hyperphoria, that the brain, recognizing the impossibility of fusion under that condition, will allow vertical tendency to show itself. This is not always the case, however, for the demand on the vertical muscles made by the effort at fusion may, and does in may instances, continue unchanged and maintains vertical equilibrium in the présence of horizontal diplopia. The same is true of the vertical muscles. The effort at fusion, vertically, is overcome by a prism, and vertical diplopia produced with the view of bringing out any tendency to lateral deviation. It often fails, for the effort for lateral fusion may persist in spite of the vertical diplopia. If these statements are true, tests for heterophoria based upon the induction of artificial diplopia are valueless. That they are valueless in a considerable number of cases, is abundantly proven by clinical evidence. But if the heterophoria is marked, that is to say, if fusion is maintained at a great expenditure of effort, it may become manifest by this means alone. In other cases, the test is not complete until the effort for fusion is overcome in both directions, lateral and vertical. For example, artificial horizontal diplopia is induced by a prism of 10° base in, and the two lights are visible on a plane at the distance of 6 *m*. If a prism of 1° base down is now placed before the R. eye, the right light should move upward to a point corresponding to the deviation of a prism of 1° (6 *cm.*), but if R. hyperphoria is present, the light will slowly sink until it has reached the plane of left light, and may stop there, even when the hyperphoria is greater in degree (vertical fusion-force again manifesting itself). If, conversely, the light is maintained in its elevated position for a few minutes, R. hyperphoria can not be declared. When, however, the light descends to the lower plane of left light, a prism of 2° should be substituted, and if it again sinks to level of left light, R. hyperphoria of at least 2° is manifest. Latent esophoria or exophoria may be determined upon the same principles. A prism with its angle in or out, placed before one eye should move the light seen by that eye to the right or left of the vertical plane of the other light, and maintain it there in lateral equilibrium. If esophoria or exophoria is present it will return to its original position. Again, latent hyperphoria can be determined by testing the elevators and depressors of each eye by prisms. If, for example, the elevators of the R. (depressors of the L.) overcome a prism of 5°, and the elevators of the L. (depressors of R.) are only able to overcome a prism of 2°, R. hyperphoria should be suspected. The diagnosis may be de-

termined by the patient wearing a prism which corrects the manifest hyperphoria for a few days, during which time some latent hyperphoria, which could not be previously diagnosed, will manifest itself. This test is of very considerable value when employed for only a few minutes. We have seen severe facial chorea develop immediately after the glasses were withdrawn, and while the patient, by his ocular muscles, was making the most strenuous efforts to restore the visual lines to their former position of equilibrium, and to overcome the diplopia which appeared before the muscles had regained that position. It would seem, therefore, an indisputable test of the correctness of the diagnosis, and a positive indication for treatment, when the asthenopia and nervous phenomena are relieved by the wearing of such a prism. For if our theories as to the causation of these symptoms when ascribed to ocular conditions are correct, prisms which compel the eyes to assume pathological deviations could not be worn without inducing similar symptoms.

RECURRENT IRITIS.

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There is probably no inflammatory trouble which is more trying to the patience of both the patient and the surgeon than recurrent iritis. The patients are for the most part in fairly good health, ready and eager for work, and yet the sword of Damocles is hanging over them, and; when they least expect it, an attack places them *hors de combat* for at least several days and it may be for two or three weeks. And then there is always the depressing influence of the possibility of a total blindness. When a surgeon has such a case as this under treatment, the question always comes up, at some part of its course, "shall I do an iridectomy?" and that too in cases where the pupil is not closed and vision is normal or nearly so. A few years ago, when iridectomy was the fashion, and oculists mutilated the iris in the same routine manner that gynecologists slit up the cervix uteri, such cases were iridectomised as a matter of course; but if a vote were taken to-day among surgeons of experience and observation, I am inclined to think that the opinion would be overwhelmingly against operative interference. When the pupil is occluded or when it is excluded, there are, of course, optical and physical reasons for excising a piece of the iris, but in regard to the purely antiphlogistic action of the iridectomy the profession seems to be getting more and more skeptical, except of course, in these mysterious and incomprehensible conditions of the acute glaucomatous process.

Synechiæ anterior and posterior, are certainly not desirable, but it is a question whether they are so often productive of harm as was at one time supposed, and it is still more doubtful whether freeing only a portion of the iris from its attachments, by means of an iridectomy, leaves the eye in any better state as regards the possibility of future inflammation. I have never been able to make up my mind that the patients upon whom I operated under such conditions would not have been just as well without it. About one thing, however, I am very certain, and that is as to the inadvisability of operating on those cases where there is a closure of the pupils associated with a hypotony of the globe due to old and recurring iridocyclitis. In no such case in which I have done an iridectomy has the artificial pupil remained patent. Usually little or no reaction follows the operation, but in the course of a few weeks the pupil fills up, and the eye returns to its for-

mer state. For the encouragement of those who have the courage to adhere strictly to the *laissez faire* system in such cases, I give the history of one typical case in which such a course was justified by the successful issue.

Major J. W. P., though serving continuously and arduously during the late war, was in the hospital only once, and then for a wound received in battle, for which his right hand was amputated. After the war he spent several years exploring in the west and was much exposed to cold and wet. During that time he had a slight attack of rheumatism. For the last fifteen years he has resided principally in Washington, and has been in good health, though having great responsibilities and being much confined. At the time of the assassination of President Garfield, he was greatly interested in the apparatus which was constructed for keeping the President's apartment cool during the excessively hot weather, and was for many days alternately in and out of an ice chamber. Soon after this he noticed a return of the rheumatic pains in various parts of his body. On October 4th, 1881, I saw him for the first time. He complained of some pain in the left eye, which was suffused, and there was marked pericorneal congestion. The eye had then been painful, more or less, for three or four days. I confined him to his room and applied four leeches to the left temple and used the atropine drops. The pupil responded only moderately, and two posterior synechiæ were noticed. Nothing pertaining to a specific affection could be found by examination or history. The further clinical history does not differ in details from those cases of rheumatic iritis with which every ophthalmic surgeon is familiar. Only at the expiration of the customary six weeks was there a subsidence of the inflammatory process. Vision was still dull and the vitreous hazy, showing a participation on the part of the choroid. During that winter he had two recurrences, one of two weeks and another of three weeks duration. In one of these attacks large doses of salicylate of sodium were used, and it was thought that they influenced the pain favorably. There was another light attack in April. During the summer of 1882, he had no attack, and it was not until February, 1883, that it returned with severity. This attack lasted nearly four weeks. There was another in May and another in November. This was the last serious attack, although from time to time during 1884-5, there would be flushing up of the eye for a few days which, however, subsided with rest, hot applications and atropine. When examined on November 21st, 1885, vision in that eye was $\frac{20}{30}$ and with -3 was $\frac{20}{20}$. Since that time he has had no trouble and uses his eyes all he desires to. There are still synechiæ posterior but the vitreous and pupil are clear.

During these four years a great deal of outside pressure was brought to bear at various times to have a change of treatment and some radical effort made to prevent a recurrence, and a well known ophthalmic surgeon in a neighboring city, who was consulted, strongly urged operative interference and gave a most gloomy prognosis. I think, however, that the result amply sustains the let alone policy to which the patient and myself adhered so rigidly and shows that an operation is not necessary to a good ending of so protracted a disease. Another feature not without interest, is the development of myopia in that eye which is due most probably to the choroiditis resulting in an elongation of of the eye in its anterior posterior diameter. Previous to the attack, his eyes were emetropic and some year sbefore I had ordered glasses for his presbyopia.

POST-DIPHTHERITIC PARALYSIS OF THE EXTERNAL RECTI; WITH A CASE.

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[Read before the College of Physicians of Philadelphia, April 16th, 1892.]

Paralysis of accommodation, or cycloplegia without alteration of the condition of the iris (mydriasis), is often seen after diphtheria, and is the most constant affection of the internal ocular muscles which occurs as a sequel of this disease. Usually bilateral, the cycloplegia is rarely complete, but when it is there may be mydriasis. There is, however, considerable diversity of expression concerning the state of the pupil under these circumstances. Sphincter palsy has been recorded by Weber[1] and by Donders[2]; sphincter paresis by Schaeby-Buch[3], and Abercrombie[4] among eighteen cases found the pupil dilated and sluggish in all. Other observers regard the affection of the pupil as comparatively rare, and for the most are in accord that there is generally an absence of pupil-symptoms.

Just as palsy and paresis of the ciliary muscle are frequent, paralysis of the external ocular muscles is comparatively uncommon. Faure[5], among other visual disturbances, mentions strabismus once. Among ninety cases recorded by Maingault[6], thirty-nine had amblyopia and ten strabismus. Rumpp[7] speaks of paralysis of the internal recti muscles. Alfred Graefe[8] noted two cases, in one of which there was paralysis of the superior oblique, and in the other paralysis of the external recti. Remak[9], among one hundred cases of post-diphtheritic cycloplegia, found ten with paralysis of one or both external recti. Rosenmayer[10], among ten cases of post-diphtheritic cycloplegia, observed two with paresis of both external recti. Arthur H. Benson[11] records a case in which the levatores palpebrarum were affected in the ninth week

[1]Virchow's Archiv, Bd. 25 and 28.
[2]Accommodation and Refraction of the Eye. New Sydenham's Translations, 1864, p. 297.
[3]A. f. O. xvii, p. 265.
[4]Trans. International Medical Congress, 1881.
[5]L'Union Médicale, Nrs. 15 and 16, 1857; quoted by Donders, loc. cit.
[6]Nagel's Jahresbericht, 1871.
[7]Nagel's Jahresbericht, 1877, p. 381.
[8]G. u. S. Handbuch der gesammten Augenheilkunde, vi, p. 73.
[9]Centralblatt f. prakt. Augenheilkunde, 1886.
[10]Wien med. Wochenschr. No. 13, 1886.
[11]Trans. Oph. Soc. of the U. K., Vol. iii, p. 265, 1883.

after the throat lesion appeared, and during the same week the external recti were attacked, and there were convergent strabismus and diplopia. Gowers[1], speaking of the affections of the special senses in diphtheria, refers to the weakness of the internal recti which may be associated with the cycloplegia, and quotes Vadelot as authority for one case in which all the muscles supplied by one-third nerve were paralyzed. He has seen double ptosis and mentions the occasional phenomenon of slight paralysis of one or another of the ocular muscles, varying from day to day, and Pagenstecher[2] has observed in an epidemic of diphtheria, palsy of the external ocular muscles (recti and obliqui) characterized by rapid onset, interchange and disappearance, occurring in the convalescent stage. Recently A. Stanford Morton[3] has reported three cases of more or less complete bilateral paralysis of the external recti following diphtheria.

Several cases of paralysis of *all* of the ocular muscles after diphtheria have been published. This complication is exceedingly uncommon. Thus Uhthoff[4] records the case of a boy aged 10, who had been treated for a mild attack of diphtheria from September 1st to September 17th, 1883. Toward the end of September he was unable to read. On October 6th, there was paralysis of accommodation, and on October 16th, complete external ophthalmoplegia. Mendel[5] describes a case which terminated fatally in a boy aged 8. Diphtheria of moderate severity was present from September 22d to September 28th, 1883. On October 4th there was paralysis of the palate; on November 2d, visual disturbance and weakness of all four extremeties; and on November 5th, double ptosis, most marked on the right side, paresis of the external rectus, paralysis of the internal rectus, with paresis of the superior and inferior recti. On the left side there was paresis of all of the recti muscles. There was no paralysis of accommodation or limitation of the visual field. On November 11th, ten days after the onset of the ocular paralysis, the patient died. Evetsky[6] published the case of a girl aged 8, who had complete bilateral ptosis, abolition of the upward and downward movements of the eyes, limited lateral movement, no loss of accommodation and normal visual fields and color-sense. Two weeks previously the child had had a sore throat with painful deglutition.

To the cases of paralysis of the external rectus muscle which have been recorded, I desire to add the following example, which occurred

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[1]Diseases of the Nervous System, 1888, p. 1223.
[2]Monatsbl. f. Augenheilkunde, Jahrgang 64, p. 358, quoted by A. Graefe, loc. cit.
[3]Trans. of the Ophthalmological Soc. of the U. K., Vol. xi, 1891, p. 106.
[4]Neurolog. Centralbl. 1885, No. 6, p. 125.
[5]Ibid, 1885, No. 6, p. 128.
[6]Arch. d'Ophtal. November and December, 1887.

in the service of Dr. Weir Mitchell, in the Infirmary for Nervous Diseases, and by whose kind permission I publish it.

Florence B., aged 4½ years, was brought for treatment January 8th, 1892. The following record was made by Dr. Joseph Leidy: The patient when four months of age, had an illness which was diagnosticated as spinal meningitis, the diagnosis being based upon the following symptoms: Retracted head, bulging on the top, and a cephalic cry, with fever. There were no permanent lesions after this attack. Six weeks before the date of her visit, the child contracted diphtheria, from which she made a slow recovery. Three weeks after the diphtheritic attack, the following symptoms were noted: Ptosis, irregularity of the pupils, the right being larger than the left, and weakness of the right and left external recti muscles. The child regurgitated liquid food; there was difficulty in swallowing; the speech was indistinct; hearing and taste were unimpaired; there was tremor of the hands and arms, and muscular weakness of the extremities. She is now unable to walk or stand, or at least indisposed to attempt to do this; knee-jerk absent; no ankle clonus; no incoordination of the hands. The child is nervous, irritable, and cries out frequently during sleep. The appetite is fair, the tongue clean, the bowels regular. The lungs are normal, and there is paralysis of the palate, as before noted, liquid foods being regurgitated. The heart's action is rapid, the pulse 120, but there is no murmur.

I made an examination of the eyes with the following result: There is convergent strabismus, the right eye "fixing;" the lateral movements are diminished, the left eye failing to move past the median line to the left, and the right not passing to the external commissure. The vertical movements are unimpaired. Attempts to demonstrate diplopia were not satisfactory, but it probably was present, and, as far as I could judge, there was false projection of the field of vision. The pupils were unequal, and facing a bright light the right measured 5 *mm.* and the left 3 *mm.*; their reaction to light and to convergence was unimpaired. There was slight ptosis of the left eye, the upper lid upon that side drooping a little lower down than that of the right, causing a narrowing of the left palpebral fissure of one-sixteenth of an inch. Rough tests seemed to show that there was paralysis of the ciliary muscles. The suggestion of Dr. Edward Jackson to employ the shadow-test to elicit this point was thought of, but it was impracticable to utilize it on account of the extreme restlessness and irritability of the child; indeed, at this time all of the examinations were very difficult. Ophthalmoscopically there were no changes of importance. Each optic disc was a vertical oval, rather pallid, and the retinal veins a little fuller than normal. The patient was ordered an elixir of quinine, iron and strychnia, Faradism for the lower extremities, massage and rest in bed.

Three days later, or on January 15th, 1892, she was admitted to the Hospital, and the ocular conditions were then as follows: Right pupil 4 *mm.*, left 3 *mm.*; ptosis as before; the right eye now moves to the external commissure; in the left eye the limitation of movement remains; there is still slight convergent strabismus and the child fixes, by preference, with the right eye; the pupils react normally.

The child was placed in bed, a pill of the sulphate of strychnia gr. one-hundredth, three times a day was ordered, together with general massage and Faradic electricity.

The following notes, made by the house doctor, Dr. Dean, are taken from Dr. Mitchell's case book.

January 25th, 1892. No regurgitation of liquids; no difficulty in swallowing; appetite good; speech much improved and words easily distinguished; no tremor of the arms and hands; disposition much improved; rarely cries, and is generally smiling and ready for conversation; cannot walk without support, being unable to place the feet in proper position, when in the recumbent posture, however, there is good control of the movements in all directions. She cannot overcome much force with the lower extremities. The hand-grasp is of fair strength and equal on both sides. Knee-jerk absent; tendo-Achilles jerk absent; plantar reflexes present; no clonus; elbow-jerk absent.

February 10th. Walks without assistance but gait faltering and unsteady; speech as good as other children at her age; appetite good; muscle power much improved in lower extremities; power of resistance in arms and fore-arms good; knee-jerk absent on both sides; reinforcement absent; tendo-Achilles jerk absent; plantar reflexes present; no clonus; elbow-jerk absent; no chin jerk.

March 11th I made the following record in regard to the eyes: Strabismus entirely absent; excursion of the eyes normal in all directions; pupils still slightly unequal, but their reactions normal in all particulars. The strabismus disappeared about one week after admission. The last examination, (March 18th, 1892) which has been made of this child reveals the following points: No strabismus; excursion of the eye-balls normal in all directions; width of the palpebral fissures equal; slight inequality of the pupils, the left being ¼ of a millimeter larger than the right; muscular power good and walks easily; knee-jerk, elbow-jerk and tendo-Achilles jerk still absent.

There are several points of interest in this case. 1. The order in which the paralytic symptoms appeared. It is difficult to state this accurately, but it seems likely that the throat affection lasted for about three weeks, that the soft palate, and probably at the same time the ciliary muscle, were affected in the fourth week, followed immediately by the ptosis or affection of the levator palpebræ. The strabismus is also placed in the same period, while somewhat later, probably in the sixth week, the weakness of the lower extremities began. In Benson's case the primary throat affection lasted four weeks, the ciliary muscles were affected in the fifth week, the soft palate in the sixth week, the hearing in the sixth week, the levatores palpebrarum and the external recti in the ninth week, and the weakness of the lower extremities in the tenth week.

2. The order in which recovery occurred: First the accommodation returned, and almost at the same time the weakness of the right external rectus muscle disappeared, that is, there was no difficulty in conjugate movement to the right; later and within a week the limitation of the movement to the left had disappeared. In close connection with this was the return of the child's natural disposition, which was pleasant and lovable. Following this came improvement in the lower extremities, so that six weeks after treatment she was able to walk

without assistance. The knee-jerk, as is usual in these cases, remains absent, and is probably the last of the functions to reappear. In connection with the order in which the ocular symptoms disappeared in this child, Uhthoff's case of complete paralysis of all of the ocular muscles is interesting. First the accommodation recovered; then the muscles engaged in certain associated movements, namely, the inferior recti, and the left external rectus and left internal rectus regained power. Then the superior recti recovered, and finally conjugate deviation to the right was possible.

3. The unilateral mydriasis: There was marked inequality of the pupils for more than a month, and even now, eleven weeks after the first pupillary phenomena were noted, there is slight difference in the diameter of the pupils. If it is true that mydriasis is more apt to occur when the cycloplegia is complete, it is probable that this may have been the condition on the right side, while on the left it was incomplete. At no time was there any imperfection in the mobility of the irides, either under the stimulus of light or convergence.

Although, this of necessity, is purely a clinical record of bilateral diphtheritic palsy of the external recti and incidental mention of the accompanying cycloplegia, it is worth while in closing, to refer briefly to our knowledge of the pathology of these cases. At the present time diphtheritic palsy is usually included among the acute nuclear palsies, but according to Dr. Gowers, although it is probable that diphtheritic cycloplegia is of nuclear origin, it is uncertain whether the paralysis of the orbital muscles, when it occurs, should be ascribed to nuclear or peripheral disease.

The history of the theories which have been advanced to explain diphtheritic paralysis in general is somewhat as follows: Charcot and Vulpian[1] attributed the palsy to an ascending neuritis from the local lesion. Buhl[2] ascribed the condition to vascular changes, capillary neuritis and exudations both in the brain and around the roots and ganglia of the spinal nerves. Déjerine[3] ascribed the cause of diphtheritic palsy to a sub-acute polio-myelitis involving the motor cells of the anterior horns and their homologous nuclei, with a secondary peripheral neuritis. Oertel and Klebs have found micro-organisms. Mendel, whose case of complete ophthalmoplegia externa came to post-mortem examination, believed the condition to be due to capillary hemorrhages (central), and a primary peripheral neuritis. Siemerling[4], in a superb research concerning chronic progressive paralysis of the ocular muscles, concludes that the local lesions found in chronic ophthalmoplegia justi-

[1] Compt. Rend. de la Soc. Biolog., 1862.
[2] Zeitschr. f. Biologie., 1867.
[3] Arch. de Physiologie, Norm. et Patholog., 1878, p. 107.
[4] Archiv. f. Psychiatrie und Nervenkrankheiten, Bd. 22, Suppl. Heft, 1891.

fy the following conclusions, namely, that there may be (1) Nuclear disease, (disappearance of the ganglion cells) with participation of the nerves to their termination in the muscles. (2.) Degeneration of the muscles and of the nerve trunks, with intact nuclei. (3.) Interruption of the conducting power of the intramedullary roots on account of sclerotic foci, with intact muscles, nerve trunks and nuclei. These conclusions, of course, do not refer especially to diphtheritic cases, but are interesting in this connection as an authorative statement in regard to the pathological condition which underlies progressive paralysis of the external ocular muscles.

A FEW WORDS ON DONDER'S VIOLET TEST FOR THE DETECTION OF ERRORS OF REFRACTION.

By J. A. Spalding, M. D.,

of Portland, Me.

It seems rather strange, that Donder's suggestion of using a violet glass for the detection of astigmatism, has never been properly cultivated. Indeed, I might say that it has rarely, if ever, been mentioned since its original appearance in that author's classic "On the Accommodation and Refraction of the Eye," in 1864. The reason for this neglect is hard to fathom, unless it lies in the fact, that the use of the violet glass requires somewhat more than the average amount of intelligence on the part of the patient.

Without any further preliminary let me, for the benefit of those who may not have the classic in question at hand, quote from pages 473 and 474, the substance of Donder's remarks upon the topic now under consideration.

"In high degrees of astigmatism, the phenomena of dispersion are very peculiar. Helmholtz observed that in general they are much more distinct, when instead of white light, such a light is employed in the investigation as consists of two prismatic colors of the greatest possible difference in refrangibility. Such light is most simply obtained by causing sunlight to pass through dark violet colored glasses. These glasses absorb the middle rays of the spectrum, with tolerable perfection, and transmit only the outermost colors, red and violet. In experimenting with the light of a lamp or candle, a dark-blue cobalt glass which transmits only the extreme red with indigo and violet in large quantities, is quite sufficient. A more or less violet tint is, however, also preferable. On looking with slight myopia or accommodation for the near point, through such a glass, toward the flame of a candle, its edges are blue, and the centre reddish; in slight hypermetropia a beautiful red border is seen around the candle, and the centre is blue[1]. On looking through violet glass at a small opening in a dark screen turned toward the day light, we see in accommodation for the violet rays, the opening surrounded by a red, in accommodation for the red, we see it surrounded by a violet margin. In the latter case, the violet rays have not yet come to a focus in the retinal image, in the former the red have already intersected and are therefore on the outside. A square opening is skirted in a like manner. If on the contrary, an astigmatic person sees such an opening as acutely as possible, and if on the violet glass being pushed before his eye, blue margins appear at the superior and inferior, and red at the two vertical edges, the subject is shown to be myopic in the vertical, or hypermetropic in the horizontal meridians.

[1] Slight degrees of ametropia are immediately distinguished by this means. In high degrees the diffusion images are too large to enable us to observe the difference of color with equal distinctness.

If he sees a point of light drawn out to a line, the extremities and the middle of the line are of different colors, and on altering the directions of the point of light, by the modifying lens, the colors also change."

Thus far from Donder's book.

Now the proof of part of this paragraph can be made upon ourselves by holding before emmetropic eyes, a convex spherical or cylindrical lens, and before that a piece of violet glass, care being taken to hold the two closely together to avoid reflections. If we take first a simple convex lens, the flame of a candle for instance, will appear more or less mis-shapen, its edges will be blue, and its centre red. With a convex cylinder, axis vertical, the edges of the flame will be blue, and the centre red, but with the axis horizontal, the edges and centre will be red, but the top and bottom distinctly blue. Much depends upon the width and the solidity of the flame. With an argand flame the centre will be red with the axis held in almost any direction. With the axis vertical the sides will be faintly blue, but with the axis horizontal the top and bottom will be distinctly blue, the centre remaining generally distinctly red.

The dispersion phenomena are very charmingly shown with a candle flame, for then on holding a convex cylinder before the eyes with the axis horizontal, the flame appears very much elongated, so that the top and bottom run out into a very fine distinctly blue tip. On reversing the axis to vertical, the flame becomes three or four times as wide as before, and the edges are now a beautiful blue. I prefer the candle test in children, because the use of a bright flame detracts from the brilliancy of the contrasting colors as seen with a candle. Still by increasing the distance from a bright flame, there is not so great a difference in the colors as seen with a large and small flame at the same distances.

The appearance of the dispersion phenomena can be well memorized, by thinking of the words, MEB and HER, or in other words, with M the Edges are Blue, with H the Edges are Red.

With hypermetropia and hypermetropic astigmatism (HM and AHM) the opposite contrasts should hold true, blue appearing where the red did in M, and *vice versa*. It is, however, impossible to produce upon ourselves to any degree of perfection an artificial HM that shall be as accurate as the artificial M that we can produce by the use of convex lenses.

If we employ a concave cylinder with the violet test, we find with the axis vertical, that the middle of the flame is blue and the edges red, and that the candle flame is appearantly split into three members. But with the axis horizontal, the top and bottom are red, and the centre very faintly blue. Whether astigmatics with genuine HM see the colors thus or not, I am not at present able to say, as I have no accurate notes at hand.

Amongst some hints that may be offered in regard to the practical use of the violet tests are these: It is better not to let the patient stand too near the light, lest the brightness of the flame drown the contrasting colors. Ten feet is not too near in the case of a candle flame, and at such a distance the colors are well defined. Each patient might take a look through a violet glass on entering the office, and thus in a second, with ordinary intelligence, say whether or not there is any visible difference in color between the centre and the edges of the flame. This requires in some cases a considerable degree of intelligence, but on the whole I have never found it difficult to obtain a quick answer to the simple question.

Of course this off-hand test has not the accuracy of the Javal Optometer, but it offers to the busy specialist a hint at the refraction, and at the axis of the astigmatism, that is not to be despised.

In the cultivation of the violet test, I would further suggest that it might be tried before, and after atropine. Try also various shapes of openings in screens, oval, diamond, square, parallelograms, or before mere points of light, as in the metalic discs in the ordinary test case.

Then again we might make comparative tests of the BRIGHTNESS of the tints in low and high degrees of simple ametropia as well as in simple and mixed or compound astigmatism. Furthermore we may study the same phenomena with various shades of violet glass. In these ways the opportunity of those with large numbers of cases of errors of refraction ought to be sufficient to determine the real value of this test, in a practical point of view.

I will venture further to emphasize the fact, that the violet glass is very useful as a means of rapidly calling our attention to cases in which the axis of the astigmatic eye is *against the rule*, and better still, to when it is oblique. For in the latter case the candle flame is not only tilted somewhat, but the colored borders make so distinct a contrast, lying as they do, obliquely to the observer, that he must be particularly unobservant if he does not instantly appreciate the fact, and call our attention to the same. If any emmetrope will hold the axis of a concave cylinder obliquely, and then through the violet glass gaze at the candle flame, he will instantly see the obliquity of the flame, and additionally the obliquity of the blue margins in relation to the flame itself. So too, it must be in cases of AHM, though reversed in colors.

Whenever the ametropia or astigmatism is slight, for instance, ¼ D, the marginal haloes with the violet test are *very faint at a distance of ten feet*, but by removing further away to twenty or thirty feet, the variation at once visibly returns.

So too, in high degress of ametropia, the size of the body of the flame becomes so great, that the margins are less defined, no matter what shade of violet we employ. But this may be compensated for by *placing the*

patient closer to the flame.

As I am personally emmetropic, the results that are here imperfectly noted, depend simply upon an artificially produced M and AM by the use of convex lenses. For that reason it is very desirable that more reliable statistics should be collected from persons truly ametropic and astigmatic, both in M as well as in HM.

There is not much difficulty in choosing the precise piece of violet glass for carrying out these tests. When my attention was first called to this subject many years ago, I went to a maker of painted glass windows, and armed with convex lenses, I tested one after another piece of violet or cobalt-blue glass until I found one that gave the same results as Donders asserted in his work. This piece I then had ground to fit into the ordinary test spectacle frame. Since then at various intervals, I have employed the glass in a desultory fashion for the rough estimation of ametropia. But after so long a time it has occurred to me that public attention might be called once more to the topic which is certainly curious and very interesting to say the least, in order that by compiling statistics we may actually discover its real value as a scientific test.

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THE LOCALIZING VALUE OF SOME AFFECTIONS OF THE EYE IN CEREBRAL DISEASE.

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The exact diagnosis of the site of the lesion in an affection of the nervous system has always been a matter of interest to the scientific physician. Owing, however, to the recent advances of surgery the subject has now more than a theoretic bearing and both, surgeons and physicians, feel the increased responsibility that these advances have brought in their train. The successes of cerebral surgery have so largely depended on an exact and early regional diagnosis that the study of localizing symptoms has become a matter of supreme practical importance.

It appears to me that sufficient stress has not been laid on the value of eye symptoms in cerebral disease. The eye is supplied by no less than five of the cranial nerves, and the evidence derived from the study of its affections is of the greatest value in localizing disease of the brain. Too often the examination of the eye is confined to a simple glance at the disc; and I may say at the outset, that the discovery of optic neuritis or its absence, has practically no localizing value whatever.

The first difficulty that confronts us in any case of cerebral disease is that of distinguishing the direct from the indirect, or distant symptoms. The latter are not due to the destructive disease itself, but are rather the results of inhibition or of the vascular disturbances in distant parts, to which the lesion gives rise. These distant symptoms come and go, while the direct destructive results of disease are characterized by their permanency, and hence we must guard ourselves against laying undue stress on any symptom, however marked, which has not been under observation for a considerable length of time.

I would say that a regional diagnosis that is based on symptoms which have been of less than a month's duration, should be received with the utmost caution. All of us recognize the transient character of the conjugate lateral deviation that occurs so frequently in cerebral hemorrhage, and the internal strabismus that is observed so often in the earlier stages of locomotor ataxy. It would be illogical to assume that these were direct symptoms or that they had any value in localizing the site of the *destructive* lesion.

I may say in passing that in the number of cases of locomotor ataxy that I have seen, I have so far only met with *internal* strabismus. My impression is that if external strabismus should occur it will be found to be associated with other symptoms, *e. g.*, ptosis, etc., pointing to an

affection of the third nerve. I would rather regard this as of syphilitic origin, than as due, even indirectly to the tabes. Direct or focal symptoms can then only be recognized by their greater constancy, and it must of course be remembered that disturbances arising from destruction of a nerve centre will be similar to those due to interference with the conductivity of any part of the nerve leading from it. Hence we must bear in mind, not only the anatomical position of the highest motor (and sensory) areas, but the exact route by which impulses are conveyed between them and their terminations.

Another difficulty arises in some cases from the latency of localizing symptoms. Extensive destructive lesions may occur in different parts of the brain without giving rise to any of the usual phenomena. I know of no satisfactory explanation of this extraordinary fact, but of course, in such cases, an exact diagnosis becomes impossible.

Local eye symptoms may be divided into two classes.

I. Disturbances of the afferent impulses or of the sensations to which they give rise, whether visual or purely sensory.

II. Disturbances of the efferent impulses which reveal themselves by paralysis or spasm of the ocular muscles.

I. (*a*) The disturbances of tactile sensibility in the eye ball merit a passing notice: They point to some alteration in the ophthalmic nerve in some part of its course; the site of the lesion may be indicated by the distribution of the anesthetic area, which may suggest the implication of other branches of the fifth, or the limitation of the lesion to the nasal nerve or its ciliary branches. Occasionally a neuroparalytic keratitis is observed and may be regarded as evidence of the trophic fibres for the cornea being involved. Merkel, Meissuer and Schiff have shown that the course of these trophic fibres in lower animals is distinct from that of the sensory fibres, and that they form a separate bundle occupying the inner border of the fifth nerve (Merkel). It is interesting to note that M. Prioleau, from his clinical and post-mortem experience, has given some ground for believing that they are also distinct in man. He has found that in some cases of tubercular meningitis anæsthesia of the cornea occurs alone, but in a few cases peripheral trophic ulcers with loss of polish and opalescence of the cornea. The explanation is to be found in the development of tubercles on the pial investment of the fifth nerve, the trophic lesions only occurring when the trophic fibres are involved.

In basal tumours this neuroparalytic keratitis is generally observed when the Gasserian ganglion is invaded by the growth.

(*b*) Visual disturbances.

I wish to emphasize the localizing value of some of these affections, they are too often neglected until all subjective examinations have become impossible. The investigation of the fields of vision affords

most important evidence for diagnosing the site of a lesion, but it is essential that the examination should be undertaken in the early stages of cerebral disease. How can a patient who is racked with pain or half unconscious submit to the trials of the perimeter or give any reliable testimony if the attempt be made? By neglecting an early investigation of this point the opportunity of exact localization of a cerebral tumour is often lost until the autopsy, which may reveal a growth in a situation which could have been, perhaps, successfully dealt with by the surgeon. Hemianopia is the term used to describe loss of half of the field of vision, thus right hemianopia would imply loss of the right half of the field of vision in each eye and would correspond of course to blindness of the left half of each retina.

Allow me to briefly recall to your memory the course of those optic fibres that convey visual impulses to the cortex. On leaving the eye the optic nerves extend backwards to the chiasma where they decussate in such a way that the fibres coming from the nasal half of the left retina unite with the fibres from the temporal half of the right retina to form the right optic tract. The left optic tract similarly derives its fibres from the left halves of the two retinæ, corresponding of course to the right half of the field of vision. Each optic tract crosses the ventral surface of the crus, then ascending under cover of the temporo-sphenoidal lobe sweeps round the crus and ends in the external geniculate body, the pulvinar, and anterior corpus quadrigeminum. These bodies form what may be called the lower or primary visual centres, from them a large number of fibres emerge and spread out under the name of the optic radiations to be distributed to the occipital cortex. It is said that some fibres from the optic tract reach their destination in this region by the posterior part of the internal capsule and do not enter the basal ganglia. Pathological evidence in the human subject tends to show that the visual area occupies the cortex of the cuneus, the lingual lobule and the superior occipital convolution. The angular gyrus in man does not seem to play the important part that has been assigned to it in the lower animals. Right hemianopia may then be due to a lesion in the left cuneus, left optic radiation, left pulvinar and its neighborhood or left optic tract. What means have we for discovering which part of this long path is blocked?

A consideration of the course of the nerve fibres that are concerned in the reflex pupillary movements for light suggest the method of determining whether the lesion is above or below the nates. The afferent fibres for this reflex are to be found in the optic tracts and then (some possibly passing through the nates) they can be traced in the wall of the third ventricle to the anterior part of the nucleus of the third nerve which is situated in the floor of the aqueduct of Sylvius. The efferent constrictor impulses are conveyed by the third nerve to the

ciliary ganglion, and thence by the short ciliary nerves to the sphincter pupillæ. If any link in this chain be broken the reaction of the pupil to light fails to show itself. When the left optic tract is destroyed in any part of its course we find on examination right hemianopia. If now a beam of light is concentrated by means of a convex lens (or concave mirror) on the left (blind) half of the retina no pupil reaction is observed as the afferent impulses for the reflex contraction of the pupil have been blocked by the lesion. This test requires very delicate manipulation in its performance, for if any light is allowed to fall on the right half of the retina the pupil at once contracts. In this way I was able in a case of hemianopia that I saw two years ago to exclude an optic tract lesion. The patient had had a slight apoplectic seizure and the right hemianopia was almost the only remaining symptom. I imagine that at the autopsy the left cuneus will be found to be the seat of the affection.

Let me quote in illustration of this point a case that was under the care of my former teacher, Dr. Dickinson of St. George's Hospital. On admission he was found to have right hemianopia, the pupils, however, reacted to light. Post-mortem, the left cuneus was almost completely destroyed by softening owing to extensive atheromatous changes in the arteries. The other patches of softening were more or less distant from this focus so that this case fully bears out the connection between the cuneus and vision.

Swanzy quotes a case observed by Brieger in which there was complete blindness of both eyes. Unfortunately only a rough observation was made that both pupils contracted to light and a diagnosis of double hemianopia due to a lesion of both occipital lobes was made. At the autopsy, only the right occipital lobe was found diseased, so that the right hemianopia had still to be explained. A further examination showed degeneration in the left optic tract. Had the pupillary reaction been more exactly determined during life the existence of the two lesions could have been diagnosed before death. 'Munk in some of his experiments on dogs showed that a correlation existed between parts of the retina and parts of the occipital lobe. It would appear that the different parts of the retina are actually represented by different portions of the cuneus. That this occurs in man also, has been conclusively proved by a case observed by Dr. Henry Hun.

The patient, aged 57, had a slight apoplectic seizure of which the only permanent symptom was a defect in the field of vision. It consisted in a loss of the whole of the left lower quadrant and the peripheral portion of the left upper quadrant in each field. After two years during which repeated examinations revealed the permanence of these defects the patient died of heart disease. At the autopsy the brain was found normal with the exception of some atheroma of the arteries and of a patch of atrophy strictly limited to the grey matter of the lower half of the right cuneus, the white matter underneath was softened to the extent of a third of an inch.

This case shows therefore that the fibres from the right upper quadrant of each retina terminate in the lower half of the right cuneus. There is some evidence for regarding the representation of the lower right quadrant of the retina taking place in the lingual lobule, *i. e.*, below the cuneus, (Swanzy). The spatial relation of these cortical areas to the retinal quadrants has far more than a purely medical bearing, it appears to me to have the deepest philosophical significance. This, however, is not the occasion for a psychological discussion; and I must pass on to consider the means we have of distinguishing cortical from subcortical lesions.

Hemianopia unaccompanied by hemiplegia, hemianæsthesia or aphasia suggests disease of the cortex; these complications appear, however, to present themselves as distant (transitory) symptoms in many cases due to destruction of the optic radiations. Hughlings Jackson has recorded a case of hemianopia from disease of the pulvinar. A lesion in this neighborhood that extended outwards and forwards would involve the internal capsule; hemianæsthesia will be found if only the posterior third be implicated, if, however, the lesion in the internal capsule extend forwards to the genu hemiplegia will be observed.

Not unfrequently aphasia is associated with right hemianopia the condition usually found then is an extensive affection involving Broca's convolution as well as the occipital lobe, probably the optic radiations are implicated. A vascular lesion in the middle cerebral could hardly produce a direct effect on the cortical centre in the cuneus. A tumor in the situation of the left insula that compressed the commissural fibres between the auditory word centre and the glossokinæsthetic centre in Broca's convolution as well as the left optic tract would doubtless give rise to the same symptoms, but I can find no record of such a case; the reaction of the pupil would distinguish it from the cases that I have just referred to.

Several cases of hemianopia due to tract lesions have been recorded. When involving the upper part of the temporal lobe they have been associated with deafness of the opposite ear. Gowers has recorded a case of tumour of inner part of temporosphenoidal lobe that first involved the left optic tract causing right hemianopia and afterwards implicated the left crus causing right hemiplegia. Nothnagel, however, points out that the common affections of the crus (softening hemorrhages) very rarely involve the optic tract, which indeed has an independent vascular supply. Finally the hemianopia may not be absolute, there are eight cases on record in which color vision only was lost, the form and light sense being practically unaffected. Swanzy quotes Verrey's most interesting case of hemiachromatopsia.

The patient had an apoplectic attack from which she rapidly recovered, she complained, however, of some difficulty in reading. A perimetric ex-

amination revealed absolute color blindness in the whole of the right side of the field of each eye with diminution but no absolute loss of the light and form senses. This condition remained unaltered for twenty months when she succumbed to another apoplectic attack. At the autopsy the cause for death was found in a fresh hemorrhage in the right cerebrum ovale and lateral ventricle while an old hemorrhagic cyst in the lower part of the left occipital lobe involving the lingual lobule and the inferior part of the cuneus explained the hemiachromatopsia.

Dr. Verry from this case infers that the color sense occupies the most inferior part of the occipital lobe and probably the posterior part of the lingual lobule, while higher towards the superior part of the occipital lobe is situated the cortical center for the light sense and probably between these two is the centre for form sense, for the latter was the function which after the color sense he found most affected, (Swanzy).

HETERONYMOUS HEMIANOPIA.

Hemianopia may also be binasal or bitemporal but these forms are rare and few cases have been examined post-mortem. Alterations in the optic disc (atrophy or neuritis) are generally to be found, as secondary changes in the optic nerve usually occur within three or four weeks of the onset of the visual failure. The pathological evidence shows that the site of the lesion is at or close to the chiasma, indeed anatomical considerations would lead one to expect such forms of hemianopia to be due to disease either at this spot or below it; were any part of the optic route affected higher up, the hemianopia would be necessarily homonymous. The anatomical relation of the roots of the olfactory nerve to the chiasma affords an explanation of the disturbance of the sense of smell in one nostril that has sometimes been observed in these cases. Bitemporal hemianopia is the more common and seems to be due to the involvement of the chiasma. In Müller's case a sarcomatous growth the size of an apple starting from the pituitary body, that compressed the chaisma in the middle line was found post-mortem. Binasal hemianopia is less frequent, indeed when the anatomical arrangement of the nerve fibres is considered, it will be seen that it could only arise from two symmetrical lesions on either side of the chiasma. The anterior part of the circle of Willis surrounds the chiasma so that atheromatous changes at the origin of the anterior cerebral arteries might give rise to this symptom and some pathological evidence gives support to the view that it occasionally arises in this way, (Knapp).

TOTAL BLINDNESS OF BOTH EYES.

This may be due to a lesion involving the chiasma, both optic nerves or both optic tracts or it may be the expression of a double cortical hemianopia involving both visual areas. Brieger's case of disease of one optic tract and one occipital lobe has been already alluded to.

(TO BE CONTINUED.)

THE TOXIC AMBLYOPIAS; THEIR SYMPTOMS, VARIETIES, PATHOLOGY AND TREATMENT.

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(Continued from Page 126.)

ETIOLOGY OF TOXIC AMBLYOPIA.

TOBACCO.—ALCOHOL-TOBACCO.—CARBON DISULPHIDE.—CANNABIS INDICA.—IODOFORM.—LEAD.—QUININE.—SALICYLIC ACID AND OTHER SALICYLATES.—COCAINE.—VENOM OF POISONOUS REPTILES.—MYDRIATIC ALKALOIDS.—DECOMPOSED FOOD.—SULPHURETTED HYDROGEN.—CARBOLIC ACID.—MORPHIA AND OTHER OPIUM PREPARATIONS.

Tobacco.—As in the case of alcohol, the more concentrated the form and the more constantly the indulgence in the tobacco poison, the greater the likelihood that the vision of the *habitué* will suffer.

I have not been able to find the report of a case where amblyopic symptoms were developed by snuff taking. Prepared snuff, it must be remembered, is much poorer in nicotine than the natural leaf tobacco. This is due to the process of manufacture during which a large proportion of its alkaloids is decomposed or escapes. According to Johnstone (6) the stronger varieties—the rappees—made of tobacco having from five to six per cent. of nicotine retain only two per cent. when fully manufactured, thus reducing their strength to that of the mildest Havana and Turkish leaf.

"Dipping" (the habit of rubbing snuff upon the gums with a brush or carrying it to the mouth upon a chewed stick previously dipped in snuff,) is mostly confined to the female sex and said to be prevalent in the Southern States, and, so far as I can learn, is not a frequent cause of toxic amblyopia.[1] A few cases are, however, on record. Among them is an interesting instance given by Blitz (7).

The patient, a woman, thirty-five years old, from the Tennessee Mountains, became so blind that she could barely distinguish light from darkness. She "dipped" a large quantity of snuff daily, but on desisting from the practice and undergoing treatment, vision was entirely restored in six weeks.

De Schweinitz (8) also mentions the case of a young woman, not otherwise a tobacco user, who got toxic amblyopia from working in a tobacco factory. It must not be forgotten that the sneezing and the

[1] Dr. Minor, of Memphis, Tenn., informs me that he has not had a case of amblyopia from "dipping" and, he adds, has never known any one addicted to that habit.

use of the handkerchief that accompany snuff taking, as well as the small quantity of nicotine commonly absorbed in "dipping" probably account for the rarity of toxic symptoms among those who indulge in these habits.

I am inclined to believe that chewing is more harmful to sight than smoking. However that may be, all that we know about tobacco amblyopia seems to indicate that *it is the nicotine that causes loss of vision.* Although in the combustion of the weed a volatile, acrid, and exceedingly poisonous empyreumatic oil—nicotianine—is produced, there is probably very little nicotine in the smoke, the latter alkaloid being partly destroyed and partly retained in the pipe, cigar stump or cigarette end.

The usual combination of a well seasoned pipe with strong ("shag") tobacco has rendered nicotine poison common in England notwithstanding the comparative infrequency there of tobacco "eating." In America, on the other hand, where pipe smoking of the short and strong kind is uncommon and the use of cigars and cigarettes almost universal, the prevalence of the chewing habit quite makes up for that comparative freedom from tobacco amblyopia which we might enjoy if we were to refrain from the latter vice. An exemplification of this truth can be seen in Germany where the preference for mild cigars and tobacco smoked in long, easily cleaned pipes, as well as the entire absence of the chewing habit largely account for the rarity of tobacco amblyopia in the Vaterland. Again, in Turkey, where cigarette smoking is almost the only form in which the weed is used by both sexes and among all classes, tobacco amblyopia is, according to Van Milligen (9), Hübsch, (10), and other competent observers, almost unknown, and yet the annual consumption of tobacco by the Turks is enormous. Van Milligen says that for many years the Nargileh and pipe have been quite out of fashion. The smoke from the cigarette tobacco (containing three to four per cent. of nicotine) is drawn into the lungs, but the mouth end is so prepared that none of the tobacco touches the lips; consequently no nicotine is directly absorbed.

In estimating the probable effect of the tobacco used in a given case Cohn (11) very properly insists that we ought to consider not only the kind but the weight of cigars when the tobacco is used in that form. He quotes a case of nicotine amblyopia where in the early stage of the disease the patient smoked first Havanas and later the same number of Dutch cigars. The Cuban cigars contain 2.02 per cent. and the Dutch 1.8 per cent. of nicotine, but as the former weighed only 4.7 grms. and the Dutch 9 grms. the latter must be held responsible for the disease.

Alcohol-Tobacco.—This mixed cause is what one finds quite frequently in most countries. The steady drinker is almost always a tobacco devotee and, as will hereafter be seen, it is difficult to say which

poison is, in such cases, responsible for the amblyopic symptoms. It may, however, be assumed that when the disease is found in a patient who drinks beer or light wines, but who smokes or chews some form of strong tobacco, the latter is probably the cause of his troubles. On the other hand, the infrequent smoker of mild tobacco (cigars and cigarettes especially) who regularly take spirits of any kind may be set down, even in the absence of other proof, as amblyopic from the drink habit. Hutchinson and other English writers claim that moderate drinkers of mild alcoholic beverages are less likely to be the subjects of tobacco amblyopia than total abstainers.

To give an idea of the frequency (in America) of these cases as compared with other causes of anaemic and atrophic states of the optic nerve the tables of Alt (12) may be quoted. Of 120 such cases he found that tobacco alone was the cause in nine instances, alcohol alone in three cases, alcohol-tobacco in 39 cases. That is to say, in more than 42 per cent. of the whole number of cases, tobacco and alcohol played the chief etiological role. Uhthoff's (3) figures, (30,000 patients), of course, refer to Germany. Of 204 cases of retrobulbar neuritic affections he puts down abuse of alcohol as producing the disease in 64 cases or 31 per cent., alcohol-tobacco in 45 cases or 22 per cent., tobacco alone in 23 cases or 11 per cent. Thus alcohol and tobacco, alone and together, were the cause of the neuritis in 132 instances—64 per cent. of the whole. In France Galezowski (13) has given some very interesting statistics based upon his observation of more than 20,000 patients suffering from diseases of the eye—statistics which fuller and later experience has confirmed. Of 151 cases of toxic amblyopia (tobacco and alcohol) only 21, fourteen per cent., were due entirely to tobacco. These were all heavy smokers, using from 20—80 grammes of tobacco daily or smoking 8—26 cigars. One-half per cent. of all the cases in the Hirschberg (14) klinic had toxic amblyopia.

After a thoughtful consideration of the foregoing facts and figures one must come, it appears to me, to these conclusions: 1. Both tobacco and alcohol, alone and combined, may produce toxic amblyopia. 2. It is probable that it is the nicotine in tobacco that produces the toxic effect. If this be true, chewing is more injurious to sight than smoking, short pipes than long ones, old or unclean ones than new or easily cleaned pipes, mild cigars and cigarettes than strong cigars, and strong tobacco than mild. 3. The form in which alcohol is taken into the system has much to do with the amblyopic effects. The lighter forms of alcoholic beverages unless indulged in to great excess do not permanently affect vision. The same quantity of alcohol which when diluted (as beer or light wine) would be harmless, might be injurious to the eye sight if taken in the concentrated forms of whiskey, brandy

or gin. This is especially true when the latter are drunk between meals or when the stomach is empty.

Carbon Disulphide.—Less than fifty cases of toxic amblyopia from this cause have been published since Delpech's (15) article appeared in 1856. This agent is a colorless liquid of a peculiarly pungent and disagreeable odor. It is almost as volatile as "sulphuric" ether and its fumes soon diffuse themselves through an apartment and vitiate the respired air. It exerts a powerful solvents effect upon fats and is used in large quantities for extracting oily matters from fabrics and other materials. It is also used in electro-plating. But its chief value in the art depends upon its power of vulcanizing or "sulphurizing" rubber. Mixed with a small percentage of monochloride of sulphur (SCl) it is extensively employed in the manufacture of rubber articles. It has not been yet established what part, if any, is played by the sulphur chloride in producing intoxication. This latter agent is a deep orange colored, non-volatile liquid and is now much used in the production of "artificial rubber," but so far, no cases of amblyopia have been reported from its separate employment.

Cannabis Indica.—Indian hemp in the form of "haschisch," "bang," "gunjah," etc., is indulged in as a narcotic stimulant by Eastern nations almost as extensively as tobacco is by us. It is known to cause, among its other toxic effects, an amblyopia closely resembling that due to nicotine and alcohol. The dried flowers are smoked, an electuary (prepared from the resin, essence of roses, musk and other aromatic substances) is eaten, while an oleaginous extract made of melted butter or oil is sipped until intoxication occurs. The active ingredients are a volatile oil and a resin. I do not know of a single case of amblyopia from this drug reported as occurring in American or European countries, but Ali, (16), who has seen many cases in Persia, speaks of it as being quite common in that country.

Iodoform.—The only case on record is the following from Hirschberg's (17) klinik.

A sixteen-year old girl was operated upon by Prof. Küster for hip-joint disease which was dressed with iodoform. During the after treatment severe disturbances of vision set in. VR=$\frac{1}{20}$, VL=$\frac{1}{30}$. There was a central scotoma of from 4° to 8° radius, otherwise the field of vision was undisturbed. Fundus entirely normal. Pupils widely dilated. Hirschberg diagnosed iodoform amblyopia. In eight days vision was again normal. Nothing is said in this report about the patient's smoking or drinking habits.

Lead.—Amblyopia among workers in lead has long been recognized, and next to alcohol and tobacco is the commonest cause of amblyopia, although the occurrence of optic nerve atrophy from this poison was not described until 1886 hy Hirschler (18). The salts of this metal find their way into the system by absorption through the skin in the case of painters (who mostly deal with white lead already mixed

with boiled oil), while in the case of workers in factories where plumbic ores are reduced or where they are subsequently prepared for the market, the respiratory tract furnishes an additional means of conveying the poison to the brain, kidneys and other organs. Oliver (19) mentions among other sources of lead poisoning, lead smelting, plumbing, working in type foundries, water polluted with lead salts, food (canned meats, fruits and vegetables), paint mixers, etc. Cosmetics containing lead are also thought to be capable of producing lead amblyopia. Atkinson (20) records a fatal case where in the brain and meninges alone an amount equal to five grains of the metal was discovered.

Quinine.—When one considers the large doses and the enormous quantity of this drug that are constantly prescribed and when one remembers how common is the occurrence of cinchonism it is remarkable that there are not more than forty or fifty cases of quinine amaurosis on record and that ocular disturbances are so rarely produced. The first of these was described by Graefe (21). The very characteristic signs and symptoms of quinine amaurosis have been developed by as little as eighty grains taken during thirty hours but it has also required doses aggregating 1300 grains extending over three days (Voorhies 22) before blindness set in. These symptoms have usually been produced by quinine taken in its pure form, but in a few instances, as in that recorded by Roosa, (23), where a strong mixture of cinchona caused the mischief—preparations of the bark have produced blindness. There is no evidence that the associated alkaloids (cinchonine, cinchinoidine, etc.,) are capable of causing a toxic amblyopia or amaurosis, but as their action in other respects resembles that of quinine, it may for the present be assumed that they may produce similar effects upon the eyes.

Salicylic Acid and Sodic Salicylate.—Several cases of poisoning are recorded from the use of these drugs now so extensively employed in rheumatic and other affections. The first and most important case reported in literature is that of Gatti (24).

Eight grammes, divided into ten doses—one every hour—were given to a perfectly healthy sixteen year old girl for acute articular rheumatism. She slept several hours after the last dose and when she awoke was absolutely blind, or had only qualitative perception of light, marked mydriasis, clear media, light gray reflex, papilla normal, edges well defined. Retinal veins filled with blood. No phosphenes. Deafness, weak cardiac impulse, small pulse, slight perspiration; pains in joints entirely gone. Urine normal. In it no trace of salicylic acid. Dullness in head, sleepiness, memory unclouded. Ten hours later patient awoke from sleep and was able to count fingers, but the deafness and mydriasis lasted until the next day. Vision finally became normal.

Cocaine.—This drug has been shown to be responsible, among its other toxic effects, for a decided though transitory amblyopia. In

Bock's (25) case six minims of a twenty per cent. solution, used as a sub-mucous injection for teeth extracting, was sufficient to produce distinct fundus changes.

Venom of Poisonous Reptiles.—This agent has been known to bring about serious results (so far as vision is concerned) in those who survive the action of the poison. In the case of poisonous serpents we have Amaral's assertion that in South America blindness as the result of snake bites is common enough. de Magalhaes (26) of Rio reports the following case:

A twenty-four year old negro was bitten by a snake. This was soon followed by great weakness, loss of consciousness, rupture of blood vessels and bleeding from the nose. After twenty-four hours consciousness returned, but headache and sleeplessness set in and lasted a month. Then failure of sight was noticed. In another month all symptoms disappeared except the visual disturbance which got worse, and then remained stationary for a year. Finally it went on to blindness. The eyes are now in constant motion (nystagmus) so that an ophthalmascopic examination is difficult, but the optic nerve is not atrophic; on the contrary the veins are hyperaemic. On a later examination de M. found a round black spot on the outer-upper side of the left papilla which looked like an old hemorrhage. Patient died shortly afterwards of small pox.

The active agent in all these cases is an albuminoid substance. Weir Mitchell has named the poison of our rattlesnake *crotaline* and says that its virulent qualities resist the influence of temperatures between 0° and 212° F., as well as most antiseptic agents. The poison of the cobra applied to the eyes of fowls acts as a powerful cycloplegic. In a case of amblyopia following "toad" poison getting into a woman's eye, Staderini and Addario (27) found that a one per cent. collyrium of the poison produced anæsthesia of the cornea and conjunctiva lasting four to five hours.

Mydriatic Alkaloids.—The local effects of these agents upon the eye are too well known to require an extended introduction. They are chiefly atropine, homatropine, daturine, duboisine, and hyoscyamine, as well as preparations of the plants from which they are derived. The amblyopia which they produce is almost altogether the result of dilatation of the pupil and paresis of accommodation. Similar effects are also produced by digitalis and aconite. Certain of these drugs are purely local mydriatics and in all of them the mydriasis and cycloplegia may be a part of the general poisoning that results from their introduction into the system by accident or design. Galezowski (28) mentions a case where the eye symptoms were traced to the wearing of a belladonna plaster!

Decomposed Food.—*Ptomaines and leucomaines affect the eye in much the same way as the mydriatic poisons.* Almost every description of decomposed or partially cooked food has produced amblyopic symptoms, especially dilatation of the pupil and accommodative paresis. It is,

however, chiefly in those countries where "high" game and half cooked food are most popular that these accidents occur. As examples of this may be mentioned "high" hare (29), uncooked meat (30), decomposed sausage (31), rotten fish (32), poisonous fungi, (33), and shellfish, (34), especially mussels are on record as causes of amblyopia. The active agent in the latter case is a diseased liver producing *mytilotoxine*—similar to curare in action.

Sulphuretted Hydrogen.—This is one of the very rare causes of amblopia. Although a violent poison in its undiluted form, it does not seem to exhibit its poisonous qualities upon the eye when breathed in its dilute state, as in illuminating gas, emanations from sewers, springs, etc. In a case reported by P. & L. Brouardel (35) this poison produced mydriasis, exophthalmos, loss of pupillary reflex, anœsthesia of the cornea, etc.

Carbolic Acid.—A very few well authenticated cases are on record from this agent.

In Nieden's (36) case 100 grms. of a three per cent. solution injected into the pleural cavity produced, among other poisonous symptoms, decided visual failure which lasted twenty hours. A merchant, æt 37, had an *empyema pleurae* for which was done exsection of the sixth and seventh ribs of right side. The cavity was daily washed out with a two per cent. carbolized solution after which patient had a sweetish taste in his mouth with some headache. Treatment continued four months without further symptoms. To hurry up matters he increased solution to three per cent and used it twice a day with greater force. Before end of second injection patient cried out and fell to the ground in convulsions, unconscious, weak pulse. Both pupils were widely dilated and did not react to light. Ether and other remedies brought him to consciousness in two hours; after which severe headache and desire to vomit. Both eyes were completely blind. Fundi (examined twelve hours after) normal except a slight haze of papillæ. Next morning patient was free of all bad symptoms and could make out the form of large objects. Following evening read large type and on the second morning, for a short time, ordinary print, On the fourth day visual power was normal.

Morphia and other Opium preparations. The opium habit (contrary to what one would expect from the dreadful inroads it makes upon the nervous energy) is not to any great degree the cause of true amblyopia. Every body is familiar with the dull cornea, the leaden iris, the injected conjunctiva and the contracted pupil of the opium slave, but visual disturbances apart from these, due to opiates, are quite uncommon when one remembers how wide spread the use of opium is. Galezowski[1] quotes Ali as saying that he had met in Teheran among the opium smokers there several cases which resembled tobacco amblyopics, but as he does not exclude the possibility of their being also haschisch users the etiology of the affection is somewhat obscure. And Galezowski's[2] own case was successfully treated by stopping immoder-

[1] l. c., p. 48.

[2] l. c., p. 51.

ate doses of opium *and* tobacco. The following is the history of Wagner's (37) well known case:

Man, 32 years old, suffered from periodical vomiting which he treated with hypodermic injections of morphine. On a journey old symptoms set in and in five days used 1.92 grms. (30 grs.) morph. acet., although from insecure hand may not have injected it all. Patient was found somnolent and with very slow, small pulse. Both pupils small and sluggish. The retinanl arteries were extremely narrow, the papilla hazy, and the veins normal. The light of a half turned down lamp was not perceived. Same conditions for two days. Patient was then removed and no further history could be obtained.

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(TO BE CONTINUED.)

ERYTHROPSIA OCCURRING FROM DIFFERENT CAUSES IN THE SAME CASE.

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This peculiar abberration of the color sense, for which the only explanation as yet offered, is that it is due to an over stimulation of the retina, affords to the ophthalmologist a wide field for investigation.

In some cases it was supposed to be due to the action of certain drugs, as in poisoning by bi-sulphide of carbon, again to prolonged mental effort, and in aphakial eyes following cataract operations, it has shown itself much to the mental disturbance of the patient.

Berry[1] relates in his article upon Erythropsia, that only one case occurring subsequent to a cataract operation has come under his notice.

He seems loth to believe that it was due to the increased amount of light entering through the coloboma, as he states that the coloboma was small and that the upper lid entirely covered it.

That a hyperæsthetic condition of the retina has a paramount influence, as well as central irritation, I think is well shown in the case that recently came under my notice.

Miss C. R., age 26, consulted me for lamellar cataract in both eyes. I advised discision and operated upon the left eye Aug. 26, '91. On Jan'y 12, '92, the left lens substance was all absorbed, several operations having been performed upon the eye. She was then refracted. Her vision with glasses was $\frac{20}{20}$, and Jaeger $\frac{1}{10}$.

Up to this time no complaint whatever of Erythropsia had been made. On

[1] Subjective Symptoms in Eye Diseases, page 66.

Jan'y 13, '92, I needled the right eye at 10 A. M. At 3 P. M. her catamenia unexpectedly came on, and at 5 P. M., all objects were to her a deep blood red. The red coloration continued for three days, gradually growing lighter in tint until it finally disappeared. Ten days after this it again appeared, this time a deep rose pink. At first it was noticed only in the morning and evening, it wearing off in the middle of the day. At every reapplication of Atropia to the right eye, within ten minutes the rose pink coloration would make its appearance. This could not be due to the Atropia accidentally getting into the left eye and dilating the pupil, as at no time did this occur. At the present time the Erythropsia pursues a very irregular course, recurring sometimes a dozen times a day and only lasting ten or fifteen minutes, again it remains throughout the entire day. It is noticed in doors as well as out, but not upon cloudy days. Out doors it is more noticeable, also when the patient looks at any white surface, and when she is nervous.

In this case we have all the three lines of causes brought out.

First.—The over stimulation of the retina by an increased amount of light caused by the removal of the lens.

Second.—The hyperæsthesia of the retina induced by nervousness, and the general disturbance caused by the catamenia.

Third.—The influence of the Atropia upon the nerve centres, for it could not be claimed that the Erythropsia was due to an increased amount of light caused by the dilatation of the right pupil, since a bandage with cotton beneath effectually kept the right eye closed.

To a certain extent I have been able to control the Erythropsia by reducing the number of applications of Atropia and the use of smoked glasses.

One peculiar feature of the case, is that at no time after the first attack, did objects assume the deep blood red coloration they at first had, but took on instead a deep rose pink.

The question concerning an increased amount of light entering through a coloboma, could not enter into the discussion of this case, as the operation was one of simple discision. That certian conditions in Erythropsia (as yet unexplained,) are present, is evident from the fact that each of the three causes separately and in combination, were sufficient to produce the Erythropsia. Where all acted at once, the coloration was much deeper than when one or two were present.

REPORT OF SIX CASES OF EXCISION OF TYMPANIC MEMBRANE AND OSSICLES.

By L. J. Hammond, M. D.,

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The operation of excision of the drum head and ossicles in the following reported cases was done after they had been subjected to the general routine methods of treatment, for periods varying from months to years, and by competent Otologists. In none of the four sclerotic cases was there any perceptible improvement noticed, while the two suppurating cases received only temporary cessation of the discharges. In each case operation upon an effort was made to determine whether there was mobility of the stapes, without which little, if anything, in the way of increased hearing could be looked for.

Case I.—Mrs. D., æt. 58. When seen last August, gave history of deafness in right ear for eight or nine years, which followed an attack of typhoid fever, and has grown gradually worse, notwithstanding the fact that she has been constantly under treatment Tinnitus most annoying symptom complained of, frequent attacks of vertigo, and headache; general health good and no predisposition to ear trouble.

Examination—tuning fork—gave R+both sides, most marked on right side. *Ordinary* voices could be heard at 3 feet on left side, while *loud* voices *only* could be heard on side most affected (right). Canals rather large and clear, membranes on both sides thickened and retracted, most marked on right; membranes freely movable as demonstrated through pneumatic speculum. After routine treatment of ear, nose and throat for two months, I advised excision, which the patient readily consented to.

Operation, right side, Oct. 18th, '91.—Membrane, incus and malleus removed. The tinnitus entirely disappeared; the only noise complained of was a clicking sound, probably due to mucous in the tube mouth, as it only occurred during the act of deglutition, or when the mouth was opened and closed. The hearing, immediately after coming out of the ether, was but slightly improved. By the third day, however, or as soon as the acute inflammatory condition had subsided, the improvement was very decided; watch heard $\frac{5}{60}$, side operated upon, and ordinary voice distinctly heard at twenty feet. Seven months after operation, whisper distinctly heard. No return of tinnitus or vertigo.

Case II.—Miss C., æt. 30 years. History of deafness for four years, which has grown rapidly worse since an attack of influenza two years ago. Seen Sept. 9th, 1891. Hearing so bad that she depends entirely on the lip movemert to reply to questions asked her. Loud voices only could be heard at two feet. Tuning fork gave R+both sides. Tinnitus so great that she declared it was the cause of her inability to hear. Examinations of membranes showed cicatrix in posterior portion of the membrana tensa right side, in addition

both membranes markedly retracted, and only slightly movable by the pneumatic speculum, except the scar which was freely movable. The naso-pharynx was decidedly atrophic, both nasal cavities being filled with dessicated mucous, causing a very fœted breath. She was treated for two months by thoroughly cleansing naso-pharynx with an alkaline solution (Dobell's), followed by the application of a solution of glycerole of iodine and iodide of pottass. to nose and throat, the Eustachian tube and middle ear being treated at the same time with vapor of iodine through the Eustachian catheter, and the middle ear inflated.

The right ear being the worst, so far as the noise was concerned, I decided to excise it first.

Operation, R. S., Nov. 29th, 1891.—Membrane and malleus removed. The incus could not be found, and as I made diligent search for it I concluded it had necrosed and been discharged during the suppuration which had occurred when the patient was an infant. Free suppuration followed the operation and continued for four weeks The tinnitus disappeared immediately after removal. The hearing increased sufficient to hear loud voice at five feet on side operated upon. The patient was seen May 3rd, six months after operation, and was so much pleased with the results that she insists on having the left operated upon.

CASE III.—O. D., Italian, æt. 28 years. Sent to me from Hazleton, Pa., Jan. 28th, 1892, with history of deafness and distressing noise for three years. Complained of vertigo and headache. Examination—Membranes, both sides sunken and atrophic. Tuning fork gave R+both sides, when placed on forehead could be heard best in right ear, watch heard $\frac{1}{5}$ left side, could not be heard on right side. Loud voice only, could be heard at four feet on the right side. The use of iodine vapor, steam, etc., through the Eustachian catheter, combined with inflation and the pneumatic speculum, all failed to, in the slightest, relieve the tinnitus, of which he complained more of than the loss of hearing.

Operation R. E., Feb. 4th, 1892.—Incus, membrane and malleus removed. Very free hemorrhage during operation, which greatly interfeared with the view, thus prolonging the operation. The next morning, (Feb. 5th,) he complained of pain in temporal region and tenderness on pressure over tragus; these symptoms continued for three days, free suppuration for eight days. Hearing, April 20th, 1892, low voice heard at five feet in ear operated on, tinnitus and vertigo entirely disappeared. There was no involvement of the mastoid during the inflammatory condition which followed for the eight days above mentioned.

CASE IV.—Mrs. B., æt. 47. Has been deaf for 11 years, which she attributed to a severe cold. Tinnitus constant, resembling the rolling of the sea (tidal), some vertigo, easy to take cold, and to use her own language, she is never rid of one before another takes its place. Examination—membranes thickened and marked depression at upper anterior portion on left side. Several members of the family have difficulty in hearing. Tuning fork R.+both sides, placed on forehead it is heard best on left side, watch not heard on either side. Loud voices only, can be heard on left side at about two feet, while on the right side moderately loud voices can be heard at four feet. Membrane on right side fairly movable, while on left side the motion was confined entirely to the anterior portion. The patient, having previously been treated by the routine methods, I felt to continue longer would be a waste of time and there-

fore advised excision.

Operation L. S., Feb. 20th, 1892.—Incus, membrane and malleus removed. Twenty-four hours later. the patient heard the ticking of the clock on the mantle, fifteen feet distance. Tinnitus and vertigo entirely absent. There was free suppuration which lasted ten days. After it was healed the hearing was not as good as at first, there was a constant tendency to new formation of membrane, which I was obliged to remove twice. While there was a slight diminution in the hearing when I saw the patient May 3d, about 2½ months after the operation, she was able to hear ordinary voice at six feet, while there was no return of tinnitus or vertigo.

CASE V.—Miss C., æt., 32 years. Three years ago had acute inflammation of middle ear followed by suppuration,the result of a severe cold. The suppuration continued for about ten months when it stopped; but again returned two months later and continued, more or less, constantly until July, when I saw her, at this time she said there had been no discharge for two weeks; but on examination I found a large crust of dried pus, and when removed quite a collection of muco-purulent discharge was found. After thorough cleansing with hydrogen proxide, the membrane on right side was found to contain a large Shrapnell perforation, through which the probe readily detected denuded bone, the remainder of the membrane was greatly depressed.

Hearing—R. S., loud voices at 1 foot only, could be heard. L. S., ordinary voice at six feet. Tuning fork placed on forehead, heard best in R. E. R.+ both sides. Tinnitus constant, resembling escaping steam. Vertigo was constant but greatly exagerated whenever the post-tympanic syringe was used on right side in cleansing through the perforation. This condition I have found quite frequent in disease involving the attic. The patient was treated by first thoroughly cleansing the ear with preoxide of hydrogen, then with a hot saturated solution of boric acid through the post tympanic syringe, naso-pharynx sprayed with an alkaline solution followed by astringent applications. Inflation of middle ear with air bag (Politzer) and dusted with finely powdered boracic acid. As the dischage continued I advised her, after, two months treatment to have the operation done as I felt sure there was necrosis of the bony wall and attic which was impossible to reach.

Operation ——— 4, 1891, remainder of membrane and malleus removed, the incus could not be found, head of malleus necrosed, after curetting and removing the necrosed tissue, the ear was again syringed with a hot saturated solution of boracic acid and canal closed with a plug of absorbent cotton. The discharge was slight for two weeks, when it entirely ceased and has continued well up to the present time. Tinnitis so slight that she can only detect it by listening. Hearing not improved.

CASE VI.—P. H., æt 56 years, seen first Dec. 5, 1891.—History of suppuration from left ear for many years (could not say how long). Hearing, R. S. fair; watch $\frac{20}{30}$, whisper distinct at 3 feet. L. S., watch $\frac{5}{30}$; whisper heard about one foot. Slight tinnitus, tuning fork heard best L. S. R.+both sides. Examination, canal filled with fœtid pus and exfoliated epithelium. When removed the membrane was found perforated in Shrapnell's region and small perforation in posterior portion of the membrana tensa which completely uncovered the shank of incus. The case having been treated by competent Otologist at various times. I advised operation from the first, feeling sure that any treatment short of the removal of these probably necrosed

bones and attic would meet with the same disappointment that the others had met.

Operation, L. S., Dec. 15, 1891.—Remainder of membrane, incus and malleus removed. Head of malleus necrosed, also necrosis of attic walls. The treatment consisted of thorough cleansing, as in Case V, until discharge ceased, which it did in seventeen days and was well when seen less than one month ago, (four and a half months after operation). Hearing remained about same as before operation.

Each of the sclerotic cases, the evening before operating the next morning, had the canals thoroughly cleansed with hydrogen peroxide and afterward closed with plug of absorbent cotton, by this means the congestion which always follows the cleansing of canal and membrane for a short while is avoided. After excision the parts are thoroughly cleansed once daily with a hot saturated solution of boric acid, and canal kept closed with cotton. The nose and throat are treated at same time with alkaline spray, and if necessary astringent applications. The suppurating cases are cleansed with hot saturated boric acid solution just before operation. The after treatment being same as the dry cases.

In all the cases where the incus was present it was removed first, *i. e.*, before the membrane was excised entirely. This was done by making an incision around the shank, when it was easily disarticulated by passing the looped curette between the articulation with malleus, at the same time drawing it forward. After loosening, it can be lifted out with forceps or by means of snare. Unless the incus is first removed it will be drawn upward and backward after malleus is detached from it, in which position it not only becomes difficult or even impossible to remove, but makes the danger of mastoid inflammation much greater from the position it takes at the opening of the mastoid cells into the bony canal.

THE BOUGIE AS A MODE OF TREATMENT IN DISEASES OF THE MIDDLE EAR.

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In the words of a recent writer in one of the British Medical Journals, no instrument has been more wrongfully, or senselessly condemned than the Eustachian bougie. Much of this opposition and condemnation arises, we believe, from a misunderstanding or ignorance as to the indications for its use, or as to the proper technique of its employment. It is not the purpose of this article to add anything new, in regard to this instrument, but by setting forth as clearly as possible, these indications and the manner of employment, in order best to meet these indications, as seen at the hands of those who have so successfully employed it; to render practical, a more general use of the bougie, by the profession as a whole.

The bougie was employed as a therapeutic remedy in ear disease, for the first time, some 25 years ago. Kramer, of Berlin[1], was among the earliest to advocate its use. How generally it was employed at that time and subsequently, it is difficult to say, but unquestionably, the credit for its employment at present, and the knowledge we have regarding it, to-day, is due to Urbantschitsch of Vienna, who, in 1883, presented it anew to the profession, embodying his researches with it, in a series of communications published in the *Wiener Medisinisch Presse*, 1883. As first employed by Kramer and others, the bougie was regarded of service only in cases of undoubted stricture as diagnosed by the ordinary test; and as this diagnosis is, in many cases, difficult to establish, the number of cases in which its use seemed applicable, was relatively few

Urbantschitsch has, however, shown that, in a large percentage of cases of disease of the middle ear, stenosis can be detected by means of the bougie alone, so that he believes in its use even as a method of routine examination.

Few cases of middle ear trouble are, in his opinion, free from swelling of the lining membrane of the Eustachian tubes, and from subsequent stenosis, in a greater or less degree. But he does not stop here, but insists that the employment of the bougie is called for and justified because of the gratifying results it works in a purely reflex manner on

[1] Handbuch der Owren Enükünde, 1867.

the mucous membrane of the tympanic cavity. In many cases of tinnitus aurium, he has used it with the most flattering effects. The adoption of it in such cases by others, has given the same happy results. It is needless to say that an universal successful issue is not claimed for it in tinnitus. No one has to treat diseases of the ear, for a long period of time, to learn that tinnitus is one of the most troublesome and baffling symptoms to meet. The particular cases in which it will succeed, can not be stated in advance; it must be employed as a routine mode of treatment in all cases where mere inflation fails.

For a correct employment of the instrument, a superficial knowledge, at least of the Eustachian tube is necessary. From the careful studies of Eitelberg, of Vienna, and others, we have a clear knowledge to-day of its anatomy. The examinations of repeated cases in the cadaver, shows the average length of the tube to be 35-45 *mm*. It forms an angle of 130-140° with the wall of the nose, and is directed in its course from inward and forward, outward and backward, a fact to be borne in mind, in the introduction of the bougie. Assuming that the length is 30 *mm*., the cartilaginous portion of the canal would be about 24 *mm*, while the bony part would occupy the rest, or 11 *mm*. Where now the cartilage and bony portions meet, there is a narrowing of the tube, called the isthmus, which has an average diameter of 1½ *mm*. Here is the site of frequent swelling and obstruction in the passing of the instrument. If a bougie is gotten past this point, it generally enters the tympanic cavity without difficulty, and, according to Urbantschitsch, when a bougie of 1½ *mm* diameter can traverse the isthmus without difficulty, there is no indication for its further use. The canal in its course from the pharynx to the middle ear, as we have seen, is partly of cartilage and partly of bone. The cartilagenous portion, in its extent, becomes turned on its axis, so that the front and external side becomes the under surface of the bony section; the posterior and inner side, the upper surface of the bony canal. The constriction, or isthmus, where these two canals join, gives to the entire tube the appearance of a double cone, with its apices in apposition. On some accounts, the more internal of the two cones has the greater interest for the anatomist, because of its intimate relation to certain important structures in the immediate vicinity. Its direction is along the wing of the sphenoid bone and lies beneath the canal for the tensor tympani muscle, and above that for the carotid artery, so that in all manipulations, in the Eustachian tube, one must constantly bear in mind the danger, by rough handling, of piercing the lower wall, and so wounding the carotid artery.

The expanded end of this bony cone is the ostium tympanicum. It measures about 5 *mm* in height and 3 *mm* in breadth. It has been an interesting question, what direction a bougie passing through its mouth,

pursued. The result of Eitelberg's investigation seems, however, to establish the fact, that in the majority of cases, it impinges on the manubrium. In several cases where a perforation in the membrana tympani existed, the bougie was found to have passed out into the auditory canal—a point of practical interest, for it demonstrates that care is necessary, not to introduce the bougie too deeply into the canal, or there is danger of rupturing the membrana tympani.

The pharyngeal end of the tube is called the ostium pharyngeum. Its average height is 9 *mm* and width 5 *mm*. Since on its position and shape, depends both, the introduction of the catheter and the bougie, its shape and position are important to the otologist. Its position is usually 1 to 1.5 *cm*, removed from the posterior end of the inferior turbinated bone and, roughly speaking, in a line with the posterior surface of the septum nasi; it runs generally from a point anterior above and external, obliquely, backward, downward and inward. Its form is quite varied, being sometimes pear-shaped, sometimes three cornered, sometimes kidney-shaped. Two lips, in children not very prominent, mark its position; the posterior lip, which is the larger of the two, proceeds from the median cartilage of the canal, the anterior lip from the lateral cartilage. From the anterior lip arises the short perpendicular plica salpingo-palatina; from the posterior lip, the plica salpingo-pharyngea. In acute inflammation of the nose and pharynx, the pharyngeal mouth becomes so swollen that inflation of the ear by means of Politzer's method sometimes becomes impossible; the catheter, however, will easily pass this obstruction, and then the introduction of air is easy. As a usual thing the beak of the catheter penetrates about 11 *mm* into the canal.

Several causes have acted to render physicians timorous in their employment of the bougie: One has been the unsatisfactory material used for the construction of the instrument; another has been lack of knowledge, as to how it should be introduced, but above all, the feeling that its introduction was attended with much danger, has deterred many.

Various substances have been used at different times, out of which to construct the bougie: Some form of rubber wound with silk, was employed at one time, but it was found too pliable; others have used the ordinary filiform urethral bougie, but these have the disadvantage of being too stiff, and so liable to wound the canal wall. A suitable material is one which will be neither too stiff nor too pliable, which will retain its form and which can be easily graded. Such a substance, Urbantschitsch has found in celluloid, and he has succeeded in perfecting bougies out of this material which will answer all the requirements necessary. These are 6–8 inches long, bulbed at each end and of six sizes, graded according to Charrière's scales. No. $\frac{1}{2}$, is $\frac{1}{3}$ *mm* in diameter, and each succeeding size $\frac{1}{3}$ *mm* larger, so that No. 1=$\frac{1}{3}$, No. 2=$\frac{2}{3}$ *mm*, No. 3=$\frac{3}{3}$ *mm*, No. 4=$\frac{4}{3}$ *mm* and No. 5=$\frac{5}{3}$ *mm*.

In most cases Nos. 2, 3 and 4 are sufficient. These bougies combine the advantage of being very durable; as each end is bulb-pointed, there are really two bougies in one and if the head, by too strong manipulation, should become broken, it is possible, easily to remove it and to construct a new bulb from the stem.

In spite of the possible dangers, which are supposed to attend the introduction of the bougie, experience shows the actual risk is almost nil; care in avoiding violence, a preservation of the ordinary rules of antisepsis and a recollection of the anatomical facts regarding the length, position of the tube, etc., is all that is necessary. The bougie should be disinfected by being placed in boiling water, a few minutes before it is to be used. A recent writer in one of our medical journals states that it is his practice to carefully wash out the Eustachian tube in advance with an antiseptic fluid. This we can not but regard as unnecessary. In 100 cases carefully studied by Eitelberg, there were only 3 cases showing any unpleasant results from the treatment, and these, mild cases of emphysema of the neck which soon subsided If it is the first time that the instrument is employed, and this applies as well for the catheter as for the bougie, cocaine can be applied with advantage to the nose and upper pharynx to obviate any disagreeable sensations the patient might experience.

A much greater consideration is an avoidance of any possible perforation of the membrana tympani by a too deep insertion of the instrument. This is entirely secured by a proper scale on the bougie. One can do this most conveniently with ink, beginning at the distal end and indicating each successive 10 millimeters by a line of ink. By this minute ruling, the position of any abnormal narrowing can be at once detected. As a general rule, which is never to be deviated from, it can be stated that the length to which the bougie is to be introduced should never be over $3\frac{1}{2}$ *cm*, in fact in most cases $3\frac{1}{4}$ *cm* is a safer guide. For the first attempt a moderately large catheter is to be selected, with rather more of a curve than is used in simple catheterization. This is introduced in the usual manner, the physician satisfying himself of the proper position of the beak by means of the diagnostic tube.

He then selects a medium sized bougie, say $\frac{2}{3}$ *mm* which will in the normal state pass the isthmus and with no previous oiling, introduce it into the catheter, which is carefully retained in position. If this position is a correct one the bougie will enter the canal with no great difficulty, giving a characteristic sensation to the hand of the introducer. Often, however, a little manipulation is necessary to accomplish its introduction, but always of the gentlest nature; the catheter may need to be withdrawn a little or rotated a little on its axis or perhaps entirely removed and one of a smaller size or of greater curve employed. Frequently to the bougie will glide in for a short distance,

10–20 *mm* and there meet an obstruction, here as elsewhere, all force should be avoided; if one or two gentle attempts convinces one of a narrowing there, the bougie must be removed and one of a smaller size put in its place.

A common source of error is found in the lodgement of the catheter in the fossa of Rosenmüller, instead of in the pharyngeal opening of the tube. If the mouth of the tube is large, an indistinct sound will be perceived with the diagnostic tube which can easily deceive one into thinking the instrument is in place; the bulb of the bougie will, however, at once encounter a firm obstruction, or if any force is exerted, the bougie may progress, but on removing it the end will be found to be bent at a nearly right angle. Certain tests are all but positive of the correct position of the bougie. Usually as the instrument enters the canal the patient will say he feels it in the region of the larynx, and when it passes out into the tympanic cavity he experiences a sharp prick which he refers to the ear. The bougie, if in position, should retain the catheter in place without any assistance of the hand, and it should present to on removal, a well defined double-curve, a larger and a smaller, corresponding to the curve of the canal. As an additional aid in treatment, the air-douche can be combined with the dilatation. Frequently it will be with the greatest difficulty, that air can be forced through before the introduction of the bougie, while afterward there is a clear passage, the only precaution, and this an all important one, to be observed is that on every occasion, the tip of the bougie is to be carefully examined, and if there is the slightest amount of blood on it, the introduction of air is to be avoided, otherwise acute middle ear trouble can easily be excited.

How often is this treatment to be employed? This all depends on the particular case, and on the effect of the treatment. If there is improvement, as there often is, after the first time it is used, it can be continued every other day, or every third day, gradually employing larger sizes of the bougie as the case demands. Rarely there is an increase of the tinnitus or deafness after its use, further attempts in such cases will scarcely succeed. In cases where, after the first treatment, there appears to be no change at all, its use should still be persevered in for a number of sittings, until, as in any other mode of treatment, it has had a fair opportunity to make itself felt.

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CAUTERIZATION IN HYPERTROPHIC RHINITIS.*

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The word cauterization in medicine is usually taken as a synonym for destruction of tissue by burning. As a rule in nasal work, we do not cauterize with this intent, but with the object of producing adhesion of the membranes to the underlying bone. This has been appropriately called "buttonhole" or "dimple" work.

My paper will not deal with other surgical means often necessary in conjunction with cauterization. Our discussion of the potential cautery will be limited to galvano-cauterization as the use of the Paquelin in the nose, has no sanction and can not be too strongly condemned, (4)

"The galvano-cautery offers an attractive method of treatment and will always remain a popular instrument, for when in working order its manipulation is a pleasure to the operator and undoubtedly produces no slight moral effect on the patient" (2). Browne (3), Mackenzie (6), Sajous (8) and Seiler (9) give it the first place as a caustic agent while Bosworth (2), Woakes (11) and others consider that the chemical cautery is preferable for most work. As Bosworth remarks (2), "There can be no question as to the success of the so-called galvano-caustic treatment." There are, however, some objections that might obtain with the general practitioner who occasionally does a little nose work, in that it is costly, cumbersome and requires considerable skill. The much vaunted "sub-mucous" operation is not so easy on the patient as on paper. In application a slight degree of movement must be kept up in the tip of the instrument or on withdrawal the flesh may stick and quite a strip of membrane be torn away. This factor and that of the high degree of heat developed in the surrounding structures sometimes gives rise to violent reaction, such as acute rhinitis, neuralgia, otitis media (10) or even facial erysipelas. (9.)

I own to the production last spring of several cases of acute rhinitis after light potential cauterization. The patients returned after a few days, stating that they had been ill with what their family physician called "la grippe." As for myself, I know these cases to have been caused by the nasal work. Since that time I have learned to apply trichloracetic acid after the manner of Gleitsmann, (5), following the electro-cautery. The resulting eschar is firmly adherent and dry, and as a rule there is no reaction.

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*Read before the Wis. State Medical Soc. at Milwaukee, May 6th, 1892.

Such chemical caustics as nitric and sulphuric acids or nitrate of silver may produce like unpleasant reaction. By these agents we may obtain the desired superficial eschar and cicatrization, but, as the products of their action are in themselves destructive, their effects may not be limited with nicety. Glacial trichloracetic or chromic acids fused on a probe do not offer these objections; the latter especially may be deemed a perfect caustic for most nasal work. Rosenthal of Berlin, in the latest German work [7] on diseases of the nose, says that he has not had success in limiting the effects of chromic acid to the area touched by the caustic. I do not appreciate this criticism for in my hands its action is limited, if so wished, to a point the size of a pin's head. I use a very fine bead, made after Bosworth's method, by dipping the end of a fine applicator in mucilage and taking up but one or two of the slender columnar crystals of the acid which are then fused to a small bead over a flame. The product of its decomposition is the inert oxide of chromium and does not spread into the tissues. Any excess of the acid should be immediately brushed away by a 5 per cent. solution of Sod. bicarb. No such ill effects as from the potential cautery follows its use by educated hands. Slight neuralgia referred to the upper incisors may ensue if the parts have not been thoroughly anesthetized and exsanguinated by cocaine. This is readily relieved by the application of heat to the face. I find the kiaro or Japanese pocket, stove a very convenient remedy.

The application of the chemical cautery is so simple that in very nervous patients one is often enabled to do the necessary work practically without their knowledge, when if aware that the doctor wished to "burn the nose" or to "use electricity," he would have a tussle with his patient, and perhaps have to give up the attempt altogether.

As before other operations a certain amount of preparation for cautery work in the nose is advisable. We get better results if the membranes are disinfected by preliminary cleansing by a suitable antiseptic spray as Seiler's fluid.[1] In many cases treatment by the same spray and application of the glycerole of iodine[2] is useful for several days preceeding. It should be borne in mind that the cauterization should be minutely limited to the most prominent parts of hypertrophy. Our friend, Dr. A. B. Farnharm, [4] has insisted upon this point in several papers before this honorable body, in previous meetings. The exsanguinating effect of the cocaine may be prolonged and a successful adhesion of the membrane be assured, if the patient be given the

[1] ℞—Sod. bicarb., Sod. bibor. aa 15.00, Sod. benzoat., Sod. salicyl. aa. 60. Thymol. Eucalyptol, aa. .30. Menthol, .15, Ol. gaulther .20, Glycerin 250. Alcohol 60. Aqua, q. s. ad 7. L (2 gal.) (The ingredients may be obtained in tablet form so that one tablet to two ounces of water equals the standard solution.

[2] ℞—Iodin. cryst. .50, Potass. iod. 1.50, Glycerin. 15.00.

camphor-menthol mixture[1] of Bishop as a spray every few hours after the cautery for the day of the operation. This is a pleasant application for latter use. Where the membrane is excessively hypertrophied, as in the posterior enlargements of the turbinated bodies, the chemical caustic does not suffice, and here the electro-cautery is better. In these cases other surgical procedures are sometimes necessary.

To recapitulate:—I prefer the fused crystal of chromic acid for most cautery work on the nose and reserve the galvano-caustic for deep work or for those instances in which the chemical cautery has been unsuccessful in relieving the stenosis and nasal congestion.

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[1] ℞—Menthol cryst., Camphor. aa 2.00 to 20.00, M. trit. et adde Benzoinal 100.00. [a 10 per cent. sol. is most useful.]

CORK SPLINTS FOR THE NASAL SEPTUM.

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The failure to obtain satisfactory results in many of the operations for deflected septum having been due in my experience to the lack of a suitable appliance to hold the previously fractured, and in some instances, cut septum in proper position a sufficient time for good union. I determined to try a hollow splint of cork—the "splints" may be prepared by whittling a selected No. 8 bottle cork into a truncated cone hollowing out the center with a large nasal trephine or "rat-tail" file, smoothing with emery-cloth, soaking in a 1-1000 corrosive sublimate solution, drying and finally coating inside and out with flexible collodion to which a fewg rains of iodoform have been added. This soon dries and the splint is ready for use. My friend, Dr. D. L. Hubbard, has kindly shown me five (5) cases in which he had used the splints all eminently successful. These cases added to six of my own, five of which were entirely successful, are evidence enough of their utility. The advantages claimed for these over metal, ivory, oakum, and other splints, are that they are antiseptic, non-absorbing, easily borne by the patient, causing little pain and scarcely any discomfort, firm while still elastic enough not to interfere with the vascular supply of the parts, non-irritating (frequently having been left *in situ* four days with no resulting ulceration), finally they are at the command of every practitioner, being easily and quickly made and varied to suit the requirements of any case. It has been the custom to insert a splint into each nostril and when necessary to cleanse, to remove and reinsert that of the one side before removal of the other, thus retaining the parts in undisturbed apposition.

104 West 71st Street.

PROGRESS.

NOTES FROM FOREIGN OPHTHALMIC JOURNALS.

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CHICAGO.

ON MONOCULAR DIPLOPIA.[1]

This is a communication made in 1891 by Galezowski to the *Société de Biologie* in which he discusses the probable origin of this curious and rather uncommon phenomenon. The symptom under discussion he particularizes as a monocular diplopia in one or both eyes unaccompanied by discoverable organic changes in the optic media or fundus and without the slightest affection of any of the oculo-motor nerves. Such cases are usually associated with a peripheral restriction of the visual field while central vision remains intact. The patients present many of the evidences of central nervous lesions, such as multiple sclerosis, myelitis, encephalitis, etc., but taken in connection with other signs and symptoms—to be afterwards described—it is easier to believe that the condition present are rather those of a general nervous character, probably hysterical.

Monocular diplopia has long ago been observed and described by several authors and Charcot himself has recently shown how much importance is to be attached to this symptom not only in the diagnosis of diseases of the brain but also of hysterical affections.

Duret lately sent a communication to the Academy in which he ascribes a central origin to a monocular diplopia present in a man who had received a severe injury to the head. Not the slightest ocular lesion could be made out. According to the author this fact proves that the double vision had its origin in the left hemisphere and that it resulted from a disassociation of function between the two hemispheres.

But whether or not the *primary* cause of the symptom be correctly located in the brain the phenomenon, says Dr. Galezowski, has its apparent seat within the eye and is certainly due to spasm of accommodation, producing a functional myopia and a secondary diplopia. Many years ago Galezowski demonstrated that in certain nervous, hysterical individuals there is occasionally produced an accommodative spasm giving rise to the above mentioned form of myopia. The following cases are certainly of great interest.

Case I.—Madam S., æt 38, presented herself complaining of a visual trouble which she had had for more than two years. She was very nervous and the subject for several years of decided hysterical seizures. Last July noticed that the whole of her left side was insensible, just as if she were paralyzed. In addition to this the left leg and arm became affected by a sort of nervous tremor which was most pronounced on attempting to execute any movement.

[1] *Sur la diplopia monoculaire, d'origine cérébrale ou hystérique. Recueil d'ophtalmologie, Mars,* 1892.

There is imperfect vision in the left eye but although there is a considerable concentric limitation of the visual field no lesion of fundus or media can be demonstrated. Finally the diplopia is most pronounced when the patient fixes an object. By means of colored glasses it is clearly proved that the diplopia is monocular and that it affects the left eye only. The right eye is normal. This diplopia was accompanied by a spasmodic myopia and when by the aid of a $-2.D$ lens the error was corrected the diplopia disappeared. Putting the eye under atropine for a month the double vision entirely vanished.

CASE II.—Madam X., aged 35, has complete anæsthesia of both legs as far as the knees so that she falls in trying to walk. Also does not see well in either eye. In this case there is a monocular diplopia in both eyes with concentric limitation of the field of vision. Although she is really emmetropic a spurious myopia has developed on both sides due to hysterical spasm of the muscle of accommodation. The two images are, in each case, 10 *cm* apart at 1 meter and 25 *cm* apart at 2 meters. A $-4.D$ lens before the right eye restored single vision. Having, in the presence of M. Huchard and his assistants, instilled a single drop of atropine into the left eye the diplopia at once disappeared and the field of vision became normal. On the contrary in the right eye where no atropine was used the monocular diplopia still persists and the visual field continues to be restricted.

CASE III.—M. H , more than 60 years of age, under treatment for a right hemichorea and an amblyopia of the right eye. He is a chronic alchoholic and has been subject to attacks of the former malady for several years but did not notice the ocular trouble until four or five months ago. An ophthalmoscopic examination showed the right eye to be free of any lesion but there is monocular diplopia and a concentric limitation of the visual field. The right sided diplopia is accompanied by myopic spasms.

What, the writer asks, is the true character, the mechanism of these visual phenomena? Is there any relation whatever between the myopia (that appears in these nervous individuals to come on quite accidentally not only in emmetropic but even in hypermetropic eyes) and the monocular double vision?

Galezowski then states that answers to these questions are furnished by the experiment made in Case II, where after the instillation of atropine into one eye the constricted field (reduced to 10° about the fixation point) on that side became almost immediately normal, the myopia disappeared and single vision returned while the abnormal symptoms continued in the nonatropinized eye. The constricted field, he thinks, is the result of arterial spasm which spasm disappears under the influence of the atrophia. As for the origin of the accommodative spasm that is to be found in the cerebral centers whence are given off the third pair of nerves and the great sympathetic. The diplopia is due secondarily to the spasmodic contraction of the ciliary muscle followed by a marked myopia; a double image is projected upon the retinal screen and monocular diplopia results. Remove the myopia by means of glassses or atropine and the double vision disappears. [Will readers of the ANNALS having access to cases of this character try this simple experiment and report the result to us?]

Dr. I. Mitvalsky gives some very practical hints[1] as to the local application

[1]Die Anwendung der grauen Salbe als locales Heilungsmittel bei parenchymatöser Keratitis und bei Hornhauttrubüngen. *Centralb. für pkt. Augenheilkunde*, Feb. 1892.

of ungt. hydrarg. in parenchymatous keratitis and in corneal opacities generally. He believes that two purposes are subserved by its rational application in specific infiltration of the cornea. First, the duration of the disease can be shortened and although it may, under treatment, go through its various and tedious stages the total duration is always less than when no proper local application is made. The ointment at first increases the vascular supply in consequence of which a more rapid absorption of the diseased products takes place. This is the way in which hot applications act and they may with propriety be used in conjunction with the salve.

It must be remempered, however, that a *too decided congestion* of the eye ball, produced in this way, is more likely to lead to inflammation of the sclera and the deeper structures of the eye—iris, ciliary body, etc.—than if the disease is left to its usual chronic, creeping course.

In the second place the disease may be sometimes cut short in its early stage by bringing about rapid and immediate absorption of the inflammatory products through the corneal lymph streams.

For these purposes we must have a remedy strong enough indeed, but one that will not irritate too much the structures subjected to its operation. The remedial agent may be employed either in fluid form or used as an ointment applied with massage.

As the result of several years of experiment Mitvalsky believes he has found the best combination with which to bring about the end in view. The pure ungt. hydrarg. is too irritating, he thinks, and makes too deep an impression on the delicate conjunctiva and cornea and is too thick for ready absorption. Made thinner and prepared according to the following formula it has acted well in his hands:

Ungt. hydrarg.	1.0
Fluid Vaseline	2.0
Lanoline	1.0.

Well mixed this makes a soft, almost fluid application and leaves little to be desired. It readily applies itself to the bulb, is not washed off by the tears and can easily be rubbed in by the massage movements of the lid over the globe. For these reasons it is probably more quickly absorbed than thicker and stronger ointments.

Blue ointment acts variously according to the condition of the cornea under treatment. *Its most marked effects are seen in the earliest stages of the infiltration period.* When isolated spots begin to form in the clear cornea and before they coalesce and invade all it quadrants is the time to attack them with this salve. It often happens that this ends the battle; the disease does not go on to new-vessel formation but remains *in statu quo.*

Later on, however, when the period of congestion sets in, when the cornea becomes vascular, when there is tenderness on pressure and especially if the question of ciliary involvement arises and there is photophobia with frontal headache, the ointment is contra-indicated. Indeed it may be laid down as a rule that *when ocular congestion with its accompanying symptoms is present in a marked degree the ointment should be used with great caution or not at all.*

Among the most interesting experiments of Mitvalsky are those where having found a syphilitic keratitis far advanced in one eye and just beginning in the other he forbade any additional treatment of the case except local massage with the ointment. *The disease in the second eye never went further than this first stage.* Similarly, also, it has been his experience that of two eyes—

one treated and the other not treated by the blue ointment—the former always escaped with less permanent haziness than the other.

This treatment of parenchymatous keratitis in the vascular stage is, as before stated, a doubtful proceeding. Sometimes it acted very nicely and seemed to cut the process short, in other instances it appeared to aggravate it

As soon, however, as the vascularization had reached its highest point and and began to decrease a steady and persistent use of the ointment was always attended by the happiest results and finally the cornea became quite clear or only the faintest haze remained. Of a hundred cases of parenchymatous keratitis treated in the Prag klinik under Prof. Schöbl and comparing the old methods of treatment with the above Mitvalsky claims that by means of the latter the duration of this troublesome and very chronic disease was lessened from one-half to one-third and that in many instances after a 3-4 weeks treatment the patient was dismissed cured. With the massage the general treatment, dieting, atropine, etc., may be ordered as usual.

Further, the writer believes, as the result of his observations, that used in conjunction with massage the the combination gives the best results *when one desires to clear up any opacity of the cornea.* On account of its mild character it may be employed daily and may be rubbed in for almost an indefinite number of minutes.

The attention of our readers is called to a useful procedure for the relief of *ectropion infantum* described by Kenneth Scott.[1] After speaking of tne common cause (purulent conjunctivitis) of this condition and of the uselessness of bandaging the replaced lids he advocates the following plan for overcoming the abnormality: Cleanse eyebrow and both palpebral surfaces. Place a spatula under the lid to be operated upon and with a half curved needle armed with a thick silver-wire suture pass it from the eyebrow downwards in the substance of the lid emerging on the free margin between cilia and conjunctiva; enter needle again on the lid margin at a point about 4 *mm* distant from point of emergenc and pass it upwards in the substance of the lid parallel to the first part of the suture and bring it out on the eyebrows 4 *mm* from first point of entrance. No traction should be made on the eyelid now, but it should be seen, simply, that the piece of silver wire exposed on the edge is closely fitted against it; then fasten the free ends of the suture by twisting them together over a small piece of india rubber or cat gut. Mould the eyelid into its proper shape by bending the silver wire in the lid over the surface of the spatula. Two sutures may be thus employed but often one, placed at the center of the lid, is sufficient. The wire should be left *in situ* for at least six days when it is easily removed by snipping through the exposed piece on the edge of the lid and then pulling out the twisted ends with forceps.

Frequent bathing with antiseptic lotions after dusting with iodoform powder is all the local dressing required.

The operation may be done without chloroform and in nine cases operated on by the author only one relapsed, owing to a too early removal of a suture. This procedure leaves behind it no cicatrical traces.

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[1]Operative treatment of infantile Ectropion. Ophthalmic Review April, 1892

NOTES FROM AMERICAN AND ENGLISH OPHTHALMIC JOURNALS.

By B. E. Fryer, M. D.,
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A SIMPLE METHOD OF TREATING MANY CASES OF LACHRYMAL OBSTRUCTION.

Dr. George M. Gould, (*New York Medical Journal*, June 4, 1892), gives his method as follows: "First empty the sac and canaliculi by dexterous pressure, and cleanse the eye and palpebral pockets of this unhealthy material, (water, mucoid and purulent.) Then cast the patients head back and to one side, or have him lie so that a teaspoonful of liquid will be held in the depression formed by the nose, orbital border and superior maxilla. Fill this space with a solution of boric acid, and with the little finger again empty the sac and canaliculi by pressure, and then as slowly lessening the pressure, allow these spaces to refill, by suction and capillary attraction, with the solution under which the puncta are submerged. Again in half a minute empty the canaliculi and sac by pressure, but this time beginning the pressure from the canthus towards the nose and downward, so as to force the antiseptic solution downward into the duct. These emptyings and refillings of the sac may be repeated several times and as often as desirable to meet the indications of the case. It will be usually found that the sac will soon become healthy, and that pressure upon it will not cause regurgitation of morbid material through the puncta."

The solution which Gould uses is composed as follows: "To the ounce of distilled water; of boric acid, ten grains; common salt three grains; chloride of zinc one grain—all deeply tinted with pyoctanin—blue, and doubly filtered after long standing."

Gould adds: "A certain number of cases will not yield to this treatment. There is too great stenosis or spasmodic contraction of the muscular sphincter of the punctum, etc., so that the cleansing solution cannot be forced into the sac and duct. In such cases I am accustomed to insert one sharp point of the iris scissors into the punctum and snip it open one eighth of an inch, perpendicularly downward toward the conjunctival fold. This gives a larger opening for the indrawal of the solution."

Gould states that he is astonished to see how rapidly cases recover under this simple treatment, that formerly would have seemed to demand slitting of the canaliculus and probings."

TEMPORARY BLINDNESS DURING LACTATION.

D. E. Netleship, (*Royal London Ophthalmic Reports*, Vol. xiv, part 2,), gives four cases of blindness during lactation. All recovered normal vision. The second case, however, had failure of sight again after the birth of a second child and after this second failure, vision was permanently reduced to $\frac{5}{30}$. In this case syphilis was strongly suspected, and post neuritic atrophy became apparent.

A CASE OF TUMOR IN EACH ORBIT; DEATH; NECROPSY IS REPORTED.

E. Treacher Collins, (*Royal London Ophthalmic Hospital Reports*, Vol. xiv, part 2). The character of the tumor was Lymphoma. Collins says of

his case, which was in a child of 1¼ years: "It presents several points of interest. First, the presence of separate tumors in the two orbits. Second, the absence of any general symptoms until a short time before death, while most of the organs of the body had deposits in them. Third, the extensive masses of growth in the abdomen around those vessels which go to form the umbilical cord. Fourth, the absence of any enlargement of the lymphatic glands in the external parts, such as neck, axilla and groins, and the extensive involvement of those in the abdomen and thorax."

Collins refers to a paper by Gayet "Sur les tumeurs symetriques des deux orbites et leur caractère symptomatique," which related case of a man, 70 years of age, who had lymphomata in each orbit. Gayet also collected four similar cases which were reported respectively by Otto Becker and I. Arnold, Leber, Ostenwald and Reymond. "In Leber's and Osterwald's cases there was found to be a large increase in the number of the white corpuscles of the blood. Leber's case exhibited symptoms of growths in the liver, spleen and kidney. In Osterwald's a post-mortem examination was made and tumors of the dura mater, brain pleura and medullary tissue of bone, etc., were discovered. In Gayet's own case the post-mortem examination was incomplete, but from the nature of the pleural lesions and the way in which the patient succumbed, he infers that there was a similar generalization of the disease. Becker and Raymond's cases were operated on apparently successfully. Becker took the tumors to be hypertrophied lachrymal glands and removed them. Two years later there had been no recurrence."

Collins also quoted a case exhibited by M. Silcock at the Ophthalmological Society, June, 1888. It was in a girl, 9 years of age, and there were tumors in both orbits which were partially removed and proved to be round-celled carcinoma. The operation for removal was done May 24, 1888. "After this the eyes continued gradually to be more proptosed. The left cornea ulcerated and the eye suppurated. It was excised on August 10, 1888, for the relief of pain. Her general health continued good, and no secondary growths were observed up to the time of her discharge from hospital. Dec. 7, 1888. On October 11, 1891, Dr. Backnell writes: "I have seen Eliza G., to-day; her general health is good, very much improved to what it was when I first saw her, she is fairly rosy, fat and growing well, and not so morose as she was. The remaining eye is protruded from the socket, so that the lids when closed do not cover the eyeball by perhaps one-eighth of an inch."

PROFOUND AFFECTION OF THE EYES IN A CASE OF PERNICIOUS ANEMIA.

DR. ELIZABETH SARGENT, (*Knapp's Archives of Ophthalmology*, Vol. xxi, No. 1,) gives an account of a case of the above disease and the lesions in the eyes and elsewhere, both macroscopically and microscopically. Referring to a paper on the pathology of pernicious fever by Dr. I. P. Crozen Griffith and Charles W. Burr, of Philadelphia, read at the Congress of American Physicians in Washington, 1891, Dr. Sargent states:

"Dr. Griffith and Burr examined the viscera of patients dying of various diseases, particularly those connected with forms of anemia. The results of their observations perfectly agree with those of Hunter, and show that although small quantities of iron, without special arrangement occur in the liver in other forms of anemia, pernicious anemia is distinguished by the presence of enormous quantities of iron deposited in the hepatic in a characteristic manner."

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"Following one of the methods they had employed, I tried the effect of solutions of potassium ferro-cyanide and hydrochloric acid upon sections of the liver, kidney and the eye, from the case I had been studying. The specimens were taken out of alcohol, well washed in water, placed in a strong solution of potassium ferro-cyanide for fifteen minutes, then left in a 2 per cent. solution of hydrochloric acid the same length of time, after which they were dehydrated and mounted in balsam in the usual way. Sections of l ver treated in this way exhibit the prussian-blue reaction, and when examined microscopically show the presence of blue granules in the *outer and middle zones* of the hepatic cells, the inner zone remaining free—in unison with the verification of Hunter's observations by Drs. Griffith and Burr. Sections of the kidney show scanty deposits of iron here and there in the tissue of the kidney, not in tubules; but the greater portion is entirely free from coloration. In contrast to the reaction mentioned above, sections of the liver from a patient of Dr. Montgomery and H. M. Sherman, of this city, who died of carcinoma of the duodenum associated with extreme anemia, show no prussian-blue reaction when tested with the above reagent. Microscopically, the cells around the central veins are found to be occupied by a dark brown pigment, while only a few blue granules are seen scattered about without definite arrangement. As regards the sections of the eye in my case, it was noticed that after subjecting them to the reagents, a strip of the retina two millimeters long, just beyond the large hemorrhage, was intensely colored and the rest of the retina up to the opposite end being more faintly stained here and there. The other parts of the eye were free from coloration. Microscopically the deeply stained strip shows the retina in the situation of a diffuse blue hue, with intensely blue granules of large size, corresponding to the large yellow pigment granules found in the same place in sections stained with alum-carmine. Scattered about sparsely through the rest of the retina are the same blue, previously yellow, granules, proving them to be deposits of iron. Within the bounds of the large hemorrhage there is no staining at all; this fact, together with the good state of preservation of the blood corpuscles would go to show this hemorrhage of very recent date. Finally there is no staining of the diffuse masses of dark, yellowish brown pigment."

Dr. John Herbert Claiborne, (*N. Y. Med. Journal*, June 25, 1992,) makes the following summary with regard to the axis of astigmatism.

1. *In Simple Hyperopic Astigmatism in a Single eye*—Positions of preference are 90°, 105°, 135°, 75°, 45°. Rarely horizontal.

2. *In Simple Myopic Astigmatism in a Single Eye.*—The axis in the large majority of cases is horizontal. The deviation is likely to be 15° from the horizontal on one side or the other, *i. e.*, the axis will be 165° or 15°. Its realm includes 30° or $\frac{1}{3}$ of $\frac{1}{2}$ of the circle, and the axis included in this realm —180°, 15°, 165° are the axis of preference. The axis 90° occurs exceptionally.

The statements made with regard to hyperopic obtain in compound hyperopic astigmatism, and the axis of compound myopia are the axis of simple astigmatism. The rules in regard to hyperopic and myopic meridia hold when mixed astigmatism occurs.

NOTES FROM OTOLOGICAL LITERATURE.

By T. Melville Hardie, B. A., M. D.

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OPENING OF THE MASTOID PROCESS IN CASES OF ACUTE OTITIS MEDIA FOLLOWING THE GRIPPE.

The frequency of middle ear inflammation in the course of the last two epidemics of grippe is a sufficient excuse, if one were needed for reference to Politzer's admirable paper in the May 1892, number of the *Annals des mal. de l'oreille., etc.*

Experience has demonstrated that in the majority of cases the abscess in influenza developes in the mastoid processes of the pneumatic as opposed to the diploetic type. None of course can occur in compact-bone processes. In the mastoiditis of influenza the abscess is most generally found in the superficial cells of that part of the process which is situated below the mastoid antrum. It is of great importance to remember this because of the ease with which operative procedures may be undertaken by the non-specialist. If the general practitioner is in a city in which special advice can be procured, by all means let it be had, but if that is impossible there should be no hesitation on the part of any intelligent man in doing what will obviate very serious possible consequences. The symptoms of mastoiditis are pretty well known and we have space for the following only: Abundant otorrhoea with depression of the postero-superior wall of the external auditory canal, severe pain on pressure over the process, continued nervous excitability. If these are observed in an otitis media which has lasted for several weeks the diagnosis of mastoid abscess may confidently be made.

The facts that resolution with the absorption of the pus is very unusual in cases following the grippe and that destructive caries is very frequent are to be remembered when considering the treatment advised. This will vary with the duration of the trouble. Within the first few days if pain is acute and no perforation has taken place paracentesis is to be performed. The mastoid inflammation is to be combatted with ice bag or Leiter coil. This is usually successful. When, however, the otitis has lasted eight or ten days without perforation of Mt. we have probably to do with a mastoid abscess and opening of the mastoid will be required in addition to paracentesis.

Politzer gives one practical hint in connection with the use of the Leiter apparatus, viz: that so long as it is well borne by the patient, we can be sure that the mastoid inflammation still persists; when on the other hand it must be taken off resolution is probable. Benefit is also derived from the daily lavage of tympanum with a weak antiseptic solution through catheter. This treatment usually suffices. If however, after three or four days of this treatment pain, fever and discharge persist, opening of the apophysis is indicated.

For the benefit of those for whom this is specially written it may be well to describe the operation briefly.

Anesthesia. Shave and scrub the mastoid region. Vertical incision (slightly concave forward) $\frac{1}{2}$ *cm* behind the insertion of the auricle and 4 or 5 *cm.* long, down to the bone. Elevate the periosteum. Arrest bleeding with tam-

pon of sublimate gauze or with artery forceps, where necessary. The gouge is obliquely applied ½–1 *cm* behind and below the external auditory meatus and a superficial fragment removed. Occasionally it is necessary to go to the depth of 1½ *cm*. In influenza the abscess in these cells rarely communicates with the antrum. Curette the abscess cavity, wash with weak sublimate solution, take one or two sutures when necessary and dress antiseptically.

HESSLER says truly (Ueber extra durale Abscesse Nach Otitis, *Archiv. f. Ohrenhk*, 33 ii,) that the study of brain affections complicating diseases of the ear is the best worked chapter in ear treatment of to-day. He has not given us anything very new in his carefully constructed paper but a brief abstract is none the less important. Extra-dural abscesses occur as frequently on one side of the head as on the other. In the majority, about 80 per cent., they are secondary, in the remainder no fistulous opening between the middle ear and the abscess can be made out (primary). Hessler's investigations as their most frequent situation corrects some statements made by Barker and de Rossi.

He found the fistula on posterior surface of the petrous bone 25 times.
Over tegmen tympani, . . 6 "
Elsewhere or not mentioned in the description, 9 "

Barker asserts that their most likely situation is over the roof of the middle ear or vicinity of the sinus and de Rossi would look for the pus in the sigmoid sulcus.

Recovery by operation resulted in about ⅓ of the cases. Death supervening in the other ⅔ through abscess of the brain, meningitis and phlebitis.

In the primary cases the abscess was found 6 times on posterior surface of the petrous bone, twice on the anterior and over tegmen tympani. 25 per cent. recovered as result of operation, The clinical symptoms are so various that the diagnosis of extra-dural abscess must be made from general meningitis purulenta sinus phlebitis and abscess of the brain by exclusion. The first is rapidly fatal. Phlebitis of the sinus is characterized by pyemic and metastatic symptoms. In abscess pressure symptoms are prominent. Operative interference is of course necessary and the chisel is we think rightly preferred to the trephine.

Our notice of recent aural surgery would be even more incomplete than it necessarily is without reference to the treatment of persistent suppuration of the middle ear by excision of the membrana tympani and auditory ossicles. A typical contribution to the subject among many recent ones is that of Reinhard (Beitrag zur Hammer-ambos excision; *Archiv. f. ohrenhk*, 33, ii.) He performed the operation in 30 cases, in 7 of which the mastoid was involved. In 16 of the remaining 23 the hammer and incus were both excised, in 8 the hammer only. Cure resulted in 15 out of the 23 cases. For 8 days after the operation the ear should be irrigated with a weak antiseptic solution. The patient should remain in bed for a day or two. In his 30 cases he never observed giddiness, paralysis of facial nerve or other unfavorable symptoms. They do, however, occasionally occur. The operation should be performed under illumination from electric forehead light, and in ordinary cases through the external auditory meatus rather than by the operation of Stacke, (*Archiv. f. Ohrenheilk*, xxxi, S. 201.)

NOTES FROM LARYNGOLOGICAL AND RHINOLOGICAL LITERATURE.

By M. D. Lederman, M. D.,

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DIPHTHERITIC PARALYSIS.

Adolf Baginsky, Berlin, the author, records three types of this sequela, observed in thirty cases of this affection.

(1.) Early appearance and paralysis of the palate, often combined with neuritis. (2.) Paralysis later on, and this without marked sepsis or gangrene. Here paralysis of diaphragm is most dangerous. This form is characterized by complete aphonia, cough dyspnœa, thoracic respiration and complicating broncho-pneumonia or sudden asphyxia. (3) Of great importance during course may be only weak pulse; sometimes affection of heart; precordial pain; weak sounds of heart with quickening great swelling of the kidney often takes place, and is very fatal. Different forms are illustrated by cases.

SOME PRACTICAL CONSIDERATIONS ON CROUP.

Verstracten, considers that the two affections, diphtheria and croup, are only varieties of one and the same disorder. He divides the therapeutics under two heads, prophylactic and curative. He advises isolation of sick children and those that live where there is diphtheria. Disinfection of the surroundings is to be performed. A general tonic treatment is advised. Locally, applications of five per cent. aqueous solution (rendered slightly alcoholic) of phenic acid are to be made. If the affliction extends to the larynx, tracheotomy is called for.

DIPHTHERITIC CROUP AT THE AGE OF 60 YEARS.

F. E. Waxham, Chicago. The patient was a female, attacked with diphtheria. The observer was called to perform intubation for the great dyspnœa. As soon as the tube was introduced, respiration was at once arrested, membrane having been pushed down in front of the tube. The tube was with drawn, and an expulsive cough expelled a membranous cast of the trachea. Breathing became normal and patient remained comfortable. The tube was not reintroduced. Four days later the patient died from pulmonary obstruction.

CASE OF RHINOSCLEROMA—TYPHUS EXANTHEMATICUS, (DISAPPEARANCE OF THE RHINOSCLERUM INFILTRATION.)

Lublinger, (Warsaw). The patient, thirty-five years old, with rhinoscleroma of the left side of the nose. A piece of the neoplasm was extirpated with the cold wire, and the diagnosis confirmed by microscopical examination. Some days after the operation the patient developed typhus. Six

weeks after the cure of the disease the nasal infiltration disappeared. Also in cases of lupus and gummata absorption of the neoplasma was observed during inter-current acute infectious diseases.

MYXO-SARCOMATA OF THE NOSE.

REINHOLD, (Würzburg). Two cases reported; both females. 1. Girl aged sixteen years, had a solid red tumor in the left naris. Extirpation of the growth was effected after incision of the nose and temporary resection of the left nasal bone. Cure resulted. Microscopical examination revealed the diagnosis of a myxo-sarcoma. No recurrence. 2. Girl, twenty-three years old, had a pale red tumor on the left side of the septum. Extirpation by the cold wire was followed by a cure. No recurrence. The microscope showed it to be a myxo-sarcoma.

NASAL POLYPUS.

W. SPENCER WATSON, (London). The case reported was that of a girl, aged seventeen, who for two years had been the subject of nasal polypus, which hung from the left nostril into the naso-pharynx, and could be seen behind the uvula.

CASE OF RHINOLITH.

SCHIFFERS, (Liege.) A large calculus had existed for several months in a woman of forty years of age, and had produced a malformation of the nose, swelling in the region of the right maxillary sinus, with discharge of very foetid pus, and aphalalgia of the same side. The calculus was extracted in two portions.

COMPLETE OCCLUSION OF THE NASO-PHARYNGEAL CAVITY.

WODON. The occlusion in this case was the result of cicatrices after syphilitic ulcerations.

THE DISEASES OF THE SO-CALLED BURSA PHARYNGEA.

CHIARI, (Wien). In three thousand patients the author has found only eight cases of the disease. Patients usually complained of nasal obstruction, or collection of mucus in the naso-pharynx. After the mucus was removed, slight ulcerations or furrows could be found, these were touched with nitrate of silver and they readily healed. In some cases extirpation of adenoid vegetations cured the cases.

ADENOID VEGETATIONS.

WROBLEWSKY, (Warsaw). In 160 cases of persons deaf and dumb, the observer states that he found 57.5 per cent. had adenoid vegetations.

BLACK TONGUE.

J. A. MASTER AND J. A. SMITH, (London). Two cases are reported. In one, the black patch disappeared spontaneously in about three weeks, and in the other it disappeared in a few days after the use of a mixture of nitric acid nux vomica, and a mouth wash of lemon juice and water. No cause was detected.

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CLINICAL NOTES.

DISLOCATION OF LENS INTO ANTERIOR CHAMBER. EXTRACTION WITH IRIDECTOMY. RECOVERY.—A man aged fifty years was brought to Presbyterian Hospital by Dr. Charles Shaffner (who was not on duty at that time), with a history of an old traumatic dislocation of the lens into the anterior chamber, which lately had been giving rise to glaucomatous symptoms. The day after admission the lens was readily extracted by the writer by introducing a wire loop through a broad peripheral incision made in the cornea by a narrow v. Graefe knife, the lens being held firmly in position by a stop needle introduced through the lower outer corneal quadrant. An irreducible prolapse of the iris occurring as the hardened lens was being extruded, was immediately excised, and the edges of the coloboma and the incision were carefully dressed. Healing was uninterrupted, and normal vision with a correcting lens was regained.

UNILATERAL MICROPHTHALMUS WITH PARTIAL ANKYLOBLEPHARON.—A negro infant of three weeks of age, the first born child of a mother who was addicted to drink, and whose grandmother had died of mammary carcinoma, was sent to the writer at the Eye Service at the Presbyterian Hospital by Dr. William G. Porter. The mother stated she had noticed the want of the right eye, and that the lids seemed peculiar since the birth of the child. Upon examination it was found that the palpebral fissure was reduced to one-half its normal size, and that the outer half was bridged over by a narrow horizontal

groove of skin. The upper lid was reduced to a mere flattened band. The conjunctival socket was extremely shallow, and the smooth shining mucous membrane was dragged towards the upper cul-de-sac. Not a vestige of an eye could be seen. Upon deep and decided palpation against the upper lid, a deeply situated globular body could be determined. A broad external canthoplasty to lengthen the palpebral slit, followed by a series of incisions through the conjunctiva to expose the supposed rudimentary organ showed a small irregular white eyeball without the least trace of any corneal membrane. The fissural opening was much increased in length by the procedure, but the rudimentary and useless eye was soon again lost to view.

CHARLES A. OLIVER, M. D., Philadelphia.

CONGENITAL OBSTRUCTION OF NASAL DUCT, FOLLOWED BY ACUTE DACRYOCYSTITIS.

Oct. 10th, 1891, Mrs. P. was delivered of a healthy female child, in an essentially normal labor. While the nurse was washing the baby she called my attention to a small ovoid tumor in the region of the right lachrymal sac. No special attention was given to it that night, but in the morning I examined it more closely. The sac was tense and elastic; the skin red and hot and the cellular tissue surrounding sac involved in the inflammation. Gentle pressure brought no discharge from the punctum. I ordered iced pads, changed every 10 minutes. The next morning the general condition was but little changed, except a slight diminution of the swelling and redness in the tissues surrounding the sac, but on pressure over the sac a considerable amount of pus was discharged from the punctum and the sac well emptied. Iced pads were continued and the sac kept empty by frequent expression. The phlegmonous character quickly disappeared and the case resolved itself into a simple purulent catarrhal inflammation of the sac. Finding no improvement for several days, after this period was reached—on the eighth day, I slit up the inferior canaliculus and incised the sac freely—for three or four days I syringed out the sac with a saturated solution of boracic acid in water, until all symptoms of acute inflammation had subsided. I then carefully searched for the outlet of the sac and found an occlusion at the entrance to lachrymal duct; this gave way quite easily and a number 3 Bowman probe was passed on two successive days. After this the contents of sac was easily evacuated into nose, and in a few days normal function was restored and has since continued.

What the nature of the obstruction was I do not know. I felt nothing like a calculus, and as there was no tendency to return after once passing the probe it was not a stricture. There was no history of syphilis, and aside from this condition no appearance of infection of the eye. The conjunctival sac and its contents remained entirely free from any sign of involvement.

I am led to report this case simply from the time of its occurrence, the child having apparently been born with acute dacryocystitis.

E. B. PATTERSON, M. D., Michigamme, Mich.

DR. GOULD, of Philadelphia, recently had an interesting case of a high degree of compound hyperopic astigmatism in a young person with almost perfect acuteness of vision after accurate correction.

The patient was a girl of 13, without many or severe reflex symptoms, with paralyzed accommodation. She was able to recognize the large letter of

the card at about a foot from the eye $=_{2}\frac{1}{60}$. With the following combination she could with either eye read $\frac{20}{30}$ easily and a number of letters in the $\frac{20}{20}$ line:

R.+Sph. 8.00 D. ⊃+Cyl. 2.50 D. ax. 80.°

L.+Sph. 8.00 D. ⊃+Cyl. 2.25 D. ax. 100.°

There was no heterophoria worth considering and the eye ground presented no noteworthy peculiarity.

ACUTE RHINITIS.

For sometime the writer has been in the habit of using a spray, composed of

Cocaine (alkaloid) . . .	gr. x
Menthol	gr. x
Benzoinol	ʒi

in the treatment of this affection with excellent results. Finding, however, that the pleasant, cool sensation, and easy respiration through the nose, resulting from the spray was not of long duration he decided to increase the strength of the solution. This was done and with the addition of camphor to the solution, succeeded in getting better results. The camphor has added materially to the efficacy of the spray. In conjunction with the menthol it gives that pleasant coolness, which is such a relief to the patient suffering from an acute coryza, and in whom the mucous membrane and the turbinated tissue are in the state of congestion. It also aids in allaying the hypersecretion while the cocaine depletes the capillary blood vessels, and produces the comfortable anesthesia. The benzoinol being such a bland, unirritating oil, assists materially in allaying the inflammation. It is an elegant basis for any of our nasal or laryngeal combinations. The solution of

Cocaine (alkaloid), . . .	gr. xx
Menthol camphor, . . .	gr. xx
Benzoinol, ...	ʒi

is of such specific gravity that it can be sprayed with an ordinary hand atomizer, or better still, with the special atomizer that is made especially for the benzoinol compounds.

M. D. Lederman, M. D., New York.

1029 Park Ave.

INFLUENCE OF INTRA-NASAL OBSTRUCTION ON THE GENERAL HEALTH.

Spencer Watson, (*The Lancet*, No. x, Vol. I, 1892), describes the varieties of stenosis as (1) Partial, (2) Complete, (3) Temporary, (4) Permanent He gives the various symptoms caused by obstruction to the accessory sinuses and does not regard hay-asthma as a simple intra-nasal disease.

He concludes by saying that if suitable treatment be directed against stenosis we may in young children prevent convulsions, deformity of the chest with its concomitant evils, and in some cases even prevent death from marasmus; 2 that in youth and early life by relieving stenosis we may prevent permanent deformity of the chest, deafness, impairment of speech and even of the mental faculties. 3 that in adult life we may prevent and in some cases cure by relieving nasal stenosis, asthama, spasmodic cough bronchitis with its complications, and various mental disturbances.

DR. JOHN S. STEWART.

Born Nov. 19, 1864 in Allegheny Co., Pa.; died April 11, 1892 of pulmonary tuberculosis, in Philadelphia, Pa.

Dr. Stewart was educated at the Western University and at the Medico-Chirugical College of Philadelphia, graduating at the latter institution in 1885, with the highest honors of his class. His health had already begun to show impairment, partially due perhaps to his severe devotion to study during his medical course, so that after his graduation he took a long sea voyage. Neither this, nor other trips to the Western States, however served to stay the progress of pulmonary disease, whose existence, however, was suspected only by a few intimate friends, so averse was he to consideration of himself or to medical treatment. Had he been more solicitous of self he might doubtless be amongst us to-day by acting upon the modern scientific conclusion that tuberculosis of the lungs is with certain conditions and reservations a curable disease.

Dr. Stewart was an excellent and successful physician, the author of a fine text-book, and a number of papers upon his special branch of study—the eye. He continued deeply interested in his work up to two weeks before his death, and only consented to leave his office when high fever was rapidly burning out his life. There was about his character and manner a combination of manliness and true gentlemanliness—a modest strength, and an almost ideal purity of personal life that brought to him the confidence and love of all who were associated with him either as patient, friend or co-worker. G. M. G.

A HAND LAMP.

By H. V. Würdemann, M. D.,
of Milwaukee.

One of the inconveniences in attending eye, ear or throat patients at their home is the difficulty of obtaining proper illumination. Where the patient is confined to bed this is particularly marked. Several years ago I saw a hand lamp used in the Fuch's eye clinic of the Vienna General Hospital which was probably the Vienna model of the one designed by Priestly Smith.

I have been using a modification of the same, made by Tiemann & Co., of New York, with much satisfaction. I am aware that there are a number of the Vienna lamps in this country but as far as I can ascertain such a portable illuminator is not in general use. There is nothing of the kind shown in any of the catalogues of the American surgical instrument makers. Such an instrument seems to me to be so necessary to the armamentarium of every specialist that I have no hesitation in bringing it before the profession.

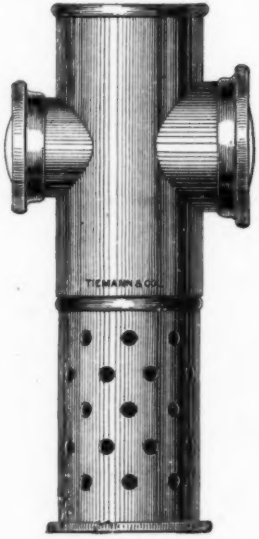

Fig. 1

Fig. 2.
Lamp Can.

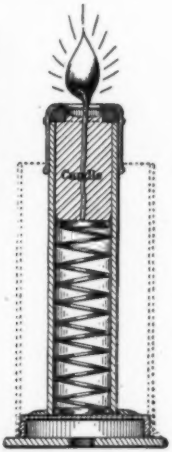

Fig. 3.
Section of Candlestick and Base.

The lamp is six inches high by two and three fourths in diameter. It has a condenser of two inches focus for general examination and one of one inch for oblique illumination, etc. It has two attachments; either or both of which may be had with the instrument. In the one a wax candle, which is self feeding (see Fig. 3), and in the other petroleum oil is burnt. Either gives a

brilliant and steady light; the lamp-can, to my mind, giving more satisfaction. If closed by the plug it will not leak and may be safely carried in any position in the pocket or satchel. Such a portable illuminator does away with the trouble and danger attending the use of the ordinary house lamp or candle at the bedside.

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